PROCENTEC

User Manual

FF Monitoring

Permanent monitoring of FF networks
Up to 10 simultaneous FF networks
Powerful web server
100 Mbps Ethernet
DIN-rail
IP 20

Version 1.0.0 – March 2014

PROCENTEC

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Important Information

Purpose of the Manual
This user manual provides information how to work with COMbricks.

Recycling and Disposal
The parts of the COMbricks can be recycled. For further information about environment-friendly recycling and the procedure for disposing of your old equipment, please contact:

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1 Product description

1.1 Introduction

FOUNDATION Fieldbus network diagnostics has never been so open and easy. The COMbricks Diagnostic Module is able to permanently check the condition of the H1 physical layer. By means of a web server the signal quality of the connected devices can be inspected and emails inform the user about critical events. Notifications and remote access assure an optimal network uptime and reduced maintenance costs.

The COMbricks FOUNDATION Fieldbus Diagnostics Module is not an active device and therefor does not require an address. It passively measures the network condition and can be wired parallel or series to/in an existing H1 segment.

FF modules can be combined with PROFIBUS DP and PA diagnostics modules to present a complete installation overview to the user.

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1.2 Remote monitoring in a web browser

Permanent and simultaneous monitoring of multiple FF networks is a powerful feature of COMbricks. Global projects and a shortage of (qualified) technical staff members are causing significant capacity problems. COMbricks offers a solution by remotely monitoring FF installations over the Internet and alerting the user by email.

The user can simply connect surrounding FF networks. The modular technology of COMbricks enables the network to be monitored when multiple repeater modules are installed.

Up to 10 FF Monitoring modules can be inserted into the backplane.

1.2.1 Email

Email messages provide real-time alerts in the event of detected faults in the FOUNDATION Fieldbus communication. These email alerts are easy to set up in the web server.

1.2.2 Channel List

The Channel List gives a detailed overview of all repeater channels (segments) and all connected stations.

1.2.3 Offshore applications

With satellite internet offshore PROFIBUS networks can be remotely monitored. Emails can inform the mainland about the status of the installation.

These applications simplify maintenance and eliminate the hassle to fly an expert over to fix a possible problem.

On the LAN local technicians can also monitor the networks.

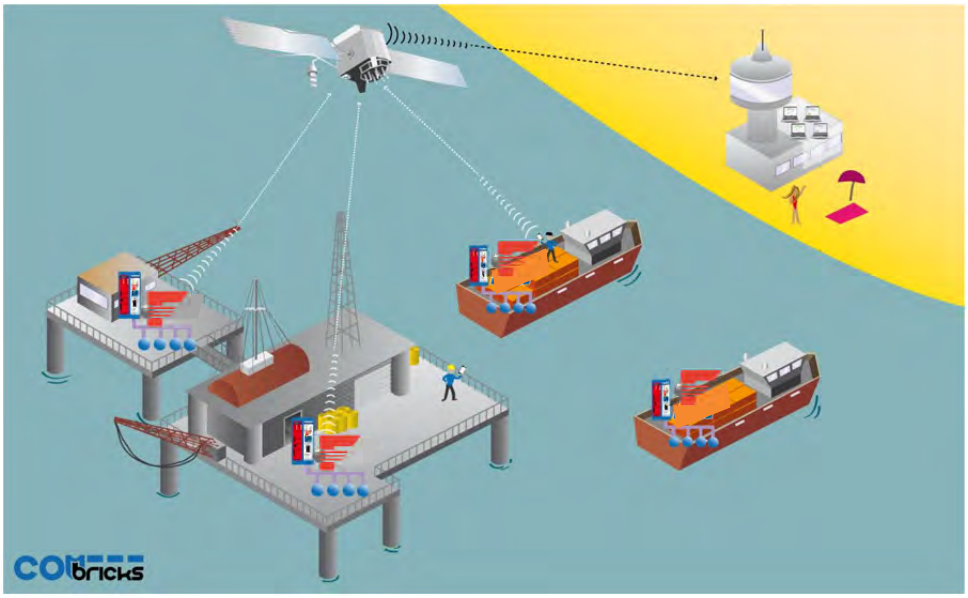

Fig. 1 - Offshore applications

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1.2.4 Other applications

- Chemical installations
- Oil and Gas installations
- Cross border installations
- Long commissioning and test cycles
- 24-7 service contracts

1.3 Output control

Relay- and digital output modules can be configured to respond directly to bus problems, such as bus voltage too low, too much noise, etc.

This offers a multitude of applications to directly and independently act on the machinery when the bus communication becomes unreliable. Especially when safety, human lives or the environment are at stake.

Power switches, hold switches, indicators, backup systems and LED towers are a few examples of machine parts that can be hooked up to the relays. COMbricks is the only monitoring product that has the capability to respond directly on the hardware with multiple relays.

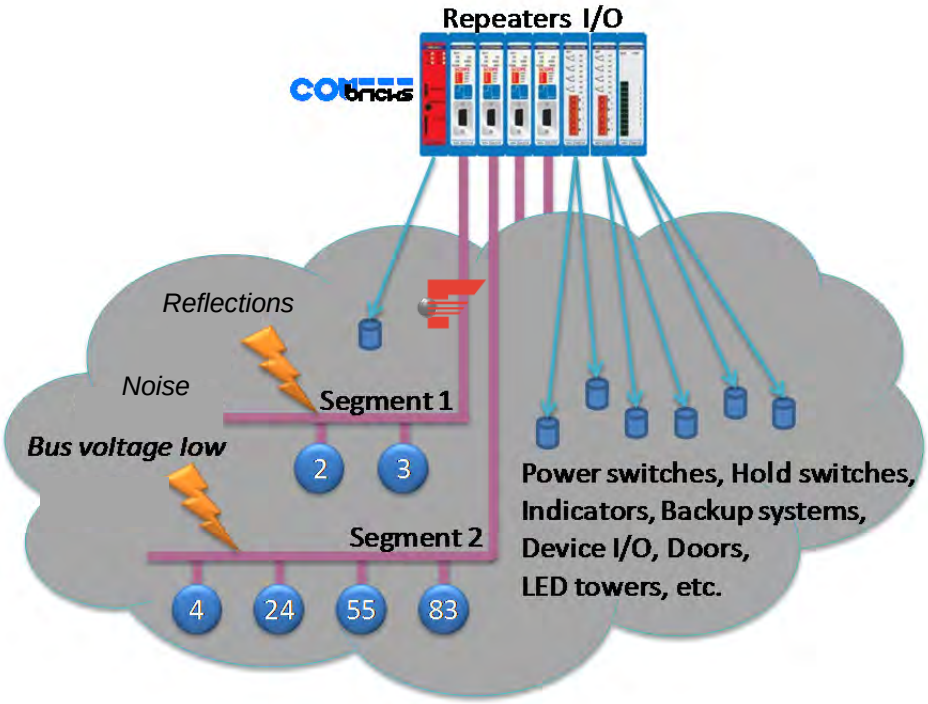

Fig. 2 - Output control

- The Head Station already contains 1 relay.
- The relays can also be configured to be switched manually or on time.

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2 Quick start

2.1 Quick start checklist

This checklist lists all the steps to a quick usage of COMbricks.

STEP 1:	Provide the Head Station with the latest firmware. .	(**7**)
STEP 2:	Prepare the backplane with the amount of required backplane units.	(**2.2**)
STEP 3:	Click the assembled backplane on the DIN-rail.	(**2.2**)
STEP 4:	Insert the Head Station in the most left slot.	(**2.3**)
STEP 5:	Insert the other modules in the remaining slots.	(**2.3**)
STEP 7:	Wire the FF modules with FF cables.	(**2.4**)
STEP 8:	Power the Head Station.	(**2.5**)

COMbricks units with Head Stations type 1A are now operational and no further steps have to be taken. For type 1B and 1C Head Stations proceed with the next steps.

STEP 9:	Insert an Ethernet cable in the Head Station.	
STEP 10:	Set the IP address to the required value.	(**2.6** + **2.7**)

COMbricks units with Head Stations type 1B and 1C are now operational, ProfiTrace OE is autonomously logging FF events. After these basic steps COMbricks can be further configured through the web server.

STEP 11:	Check the modules and administrative info in the web server.	(**2.8**)
STEP 12:	Test ProfiTrace OE on the FF installation.	

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2.2 Prepare the backplane

Click the fixed backplane on the DIN-rail and add additional backplane units to the right side if required (see **Paragraph 3.3** and **3.4**).

2.3 Insert modules

Insert the required modules in the slots of the fixed backplane (see **Paragraph 3.6**). The Head Station with the red front plate should be placed in the most left slot (with the large connector). Place the other modules in the remaining slots. The slots have a polarity and can only be inserted one way.

2.4 Wire the repeater modules

Connect the FF cables to the modules (see **Paragraph 7.2.1**).

2.5 Power the Head Station

Provide a 24 VDC power supply to the Head Station through one of its 2 power connectors (see **Paragraph 3.8**).

2.6 Customizing the IP number through the web server

The default IP address of the Head Station is **192.168.1.254**. Follow the steps below to customize the IP address of the Head Station:

STEP 1:	Insert an Ethernet cable in the Head Station which is connected to the enterprise LAN or directly to the PC.
STEP 2:	Make sure the IP address of your PC is on the same subnet as the switch (192.168.1.xxx).
STEP 3:	Open your web browser and enter 192.168.1.254 in the address field. This is the default IP address of the COMbricks.
STEP 4:	The web server of the COMbricks will appear.
STEP 5:	Click in the menu on the left on "IP config".
STEP 6:	Update the IP settings and confirm it by clicking on "Save" (see **Fig. 3**).
STEP 7:	The web page will now reload with the new IP address.

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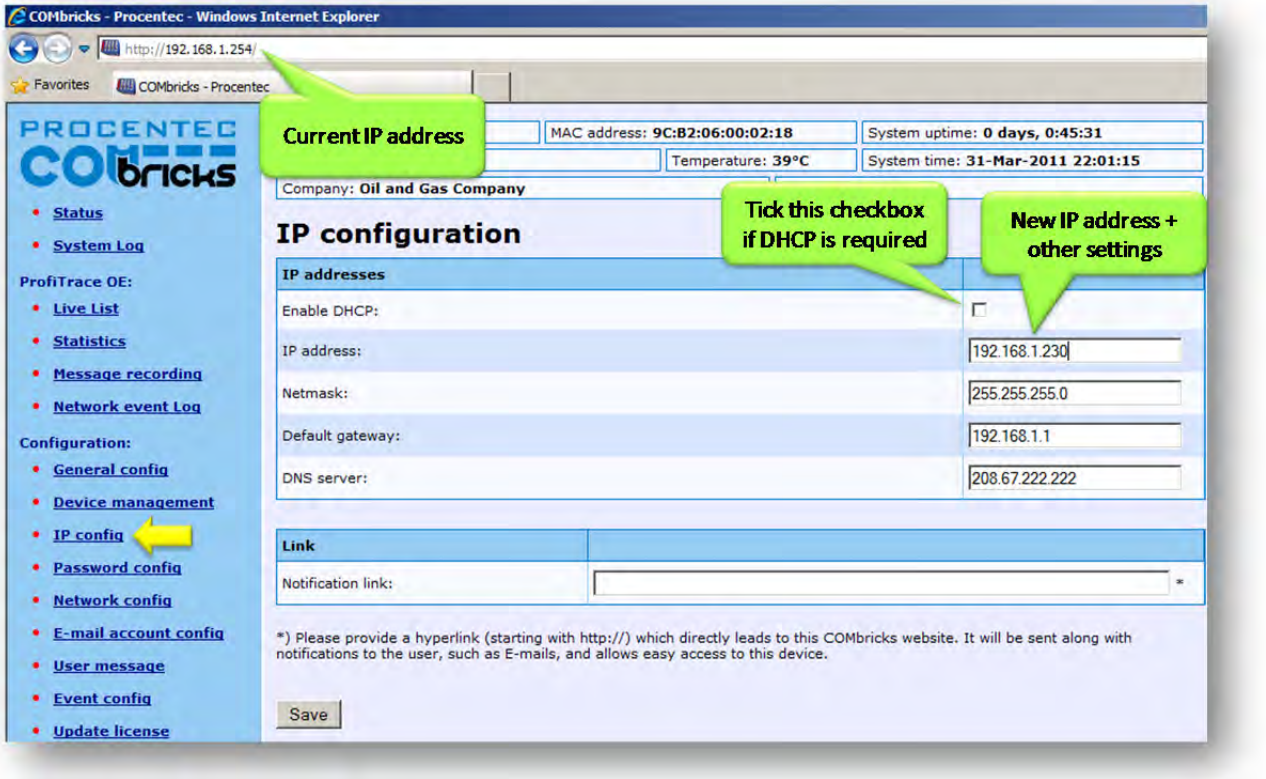

Fig. 3 - Customizing the IP address in the web server

The Notification link name is included in the event emails so that the user can directly jump to the specific COMbricks unit without knowing its local IP number. An example is: www.boiler5.oag.com. The router of the network or the internet server has to reroute this name to an IP number.

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2.7 Customizing the IP number through the Discovery Tool

The COMbricks Discovery Tool can be downloaded from **www.combricks.com**.

After start-up all the available COMbricks units can be discovered and directly customized with the required IP address (see **Fig. 4**).

The Discovery Tool works on an enterprise LAN, WLAN and with a direct cable between COMbricks and PC.

If you are not sure which COMbricks you are customizing, the LEDs can be flashed with a button in the Discovery tool (flashing). The LEDs will blink for 5 seconds to give the user a visual confirmation.

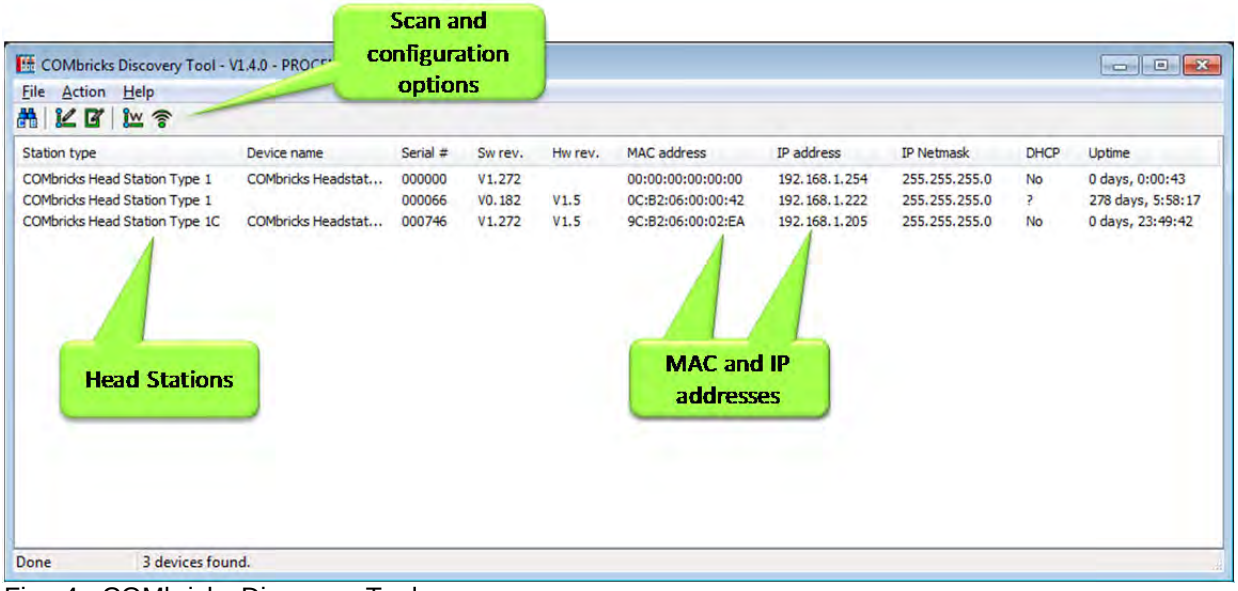

Fig. 4 - COMbricks Discovery Tool

It is recommended to have only one network interface connection active (only wireless or only wired). In some cases the Discovery tool does not list all the COMbricks units when multiple network interfaces are active.

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2.8 Checking the modules and the administrative info in the web server

After customizing the IP address, the modules can be checked in the web server. Click on "Status" to see an overview of the available modules and their respective description + version numbers (see **Fig. 5**).

Modules can be inserted and removed during operation. A change in hardware should be directly visible in the Status screen.

On the top of the screen the administrative info is also visible (see **Fig. 5**). If the administrative information has to be altered, it can be done by clicking on "General config".

On the bottom of the screen the connected clients with this COMbricks are displayed.
All connections are listed here:

- Web connections
- FTP connections
- CommDTM connections
- Telnet connections
- ProfiTrace Streaming connections

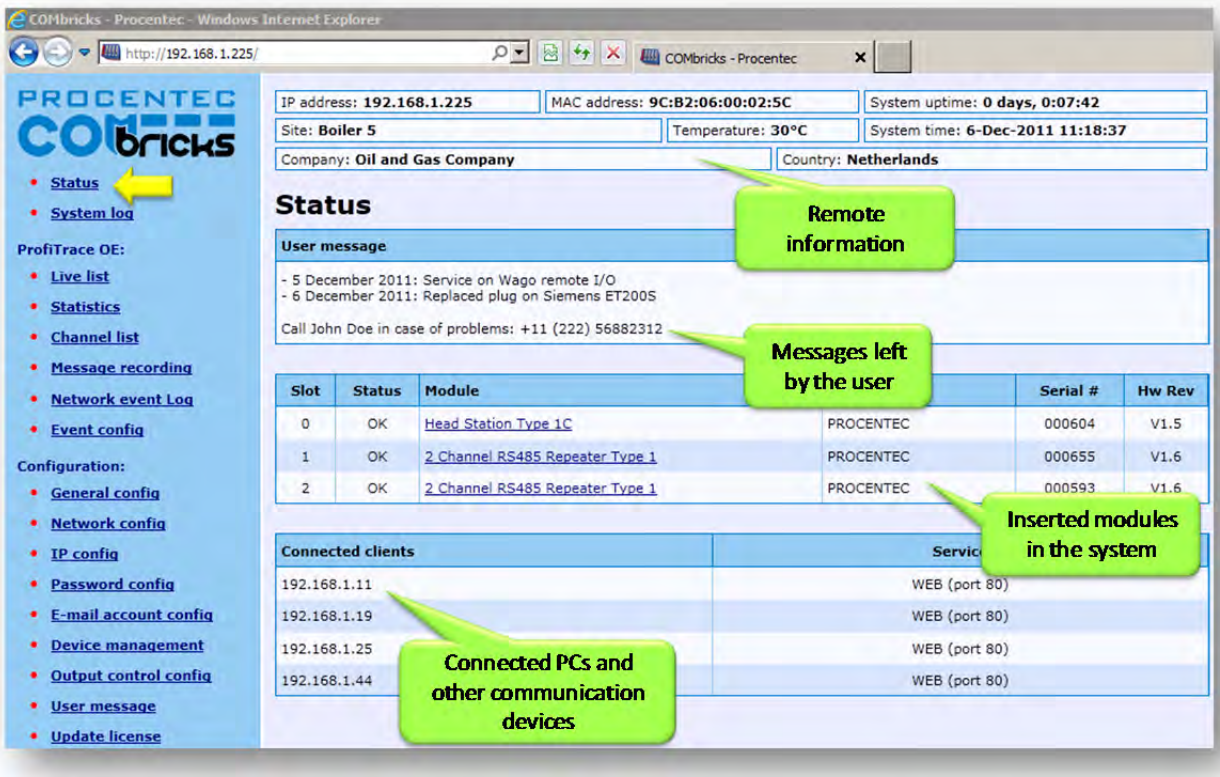

Fig. 5 - Overview of the available modules

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2.9 Resetting the Head Station

By means of the "Menu Nav" switch on the front of the Head Station (see **Fig. 6**), COMbricks can be reset, warm started or loaded with configuration data. Please follow the procedure described in **Paragraph 6.4**.

The following selections are possible:

- Read settings from SD card
- Save settings on SD card
- Clear password
- **Reset to factory defaults**
- Warm start

Fig. 6 - Menu-switch

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3 Installation instructions

3.1 Location

COMbricks can be installed everywhere in a non-hazardous area that complies with IP 20 (DIN 40 050) and the specified temperature range of 0..60 ^{o} Celsius.

3.2 Position

COMbricks can be installed in every position, but it is recommended to install it with the cables pointing down. In this position it is also easier to read the status LEDs.

3.3 Mounting and un-mounting backplane units

The backplane of the COMbricks has to be mounted on 35 mm DIN-rail with a minimum width of 50 mm to fit a fixed backplane for 2 modules.

Fig. 7 illustrates how to mount and dismount the backplane on and from the DIN-rail. For the un-mounting an appropriate screwdriver is required.

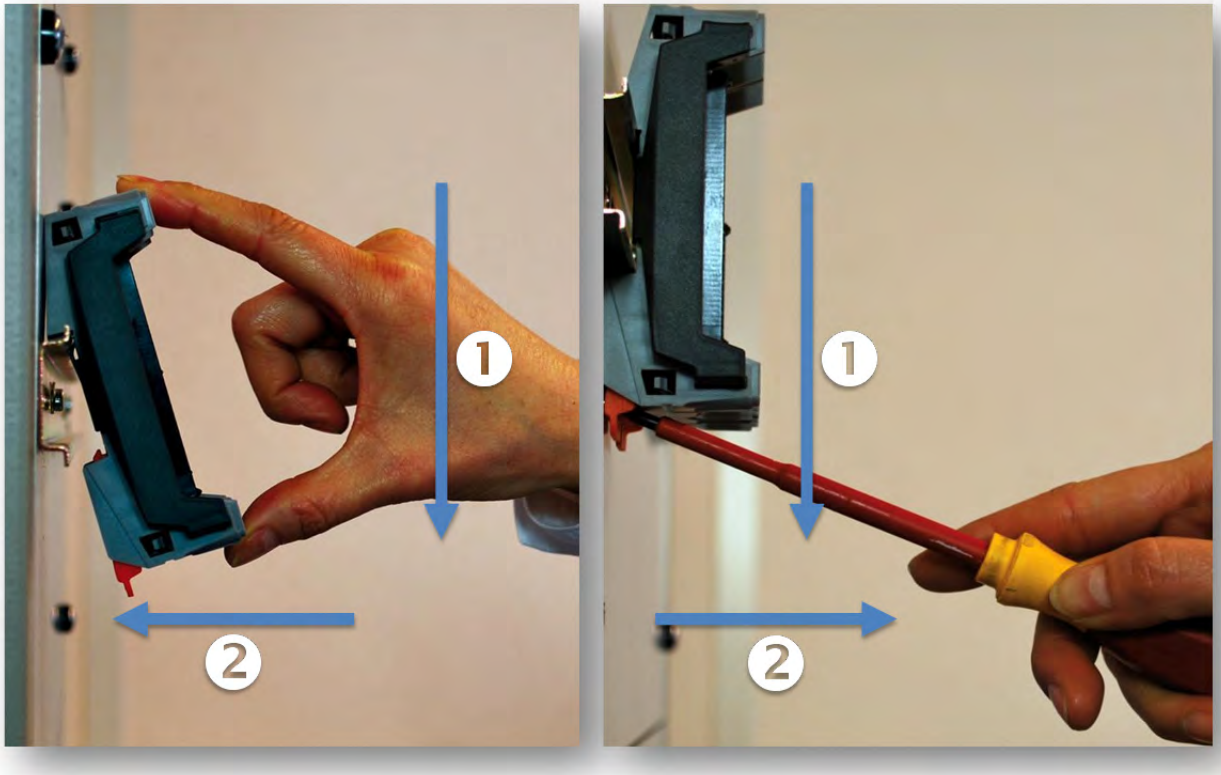

Fig. 7 - Mounting (pull-down + push) Un-mounting (click tap + pull)

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3.4 Adding backplane units

The additional backplane units as described in **Paragraph 3.3**. To merge them remove the plastic covers on the side of the backplane units that have to be merged. Push both backplane units together until no more movement is possible (see **Fig. 8**).

Do not add or remove backplane units while the backplane is powered!
This can cause serious damage to the COMbricks set.

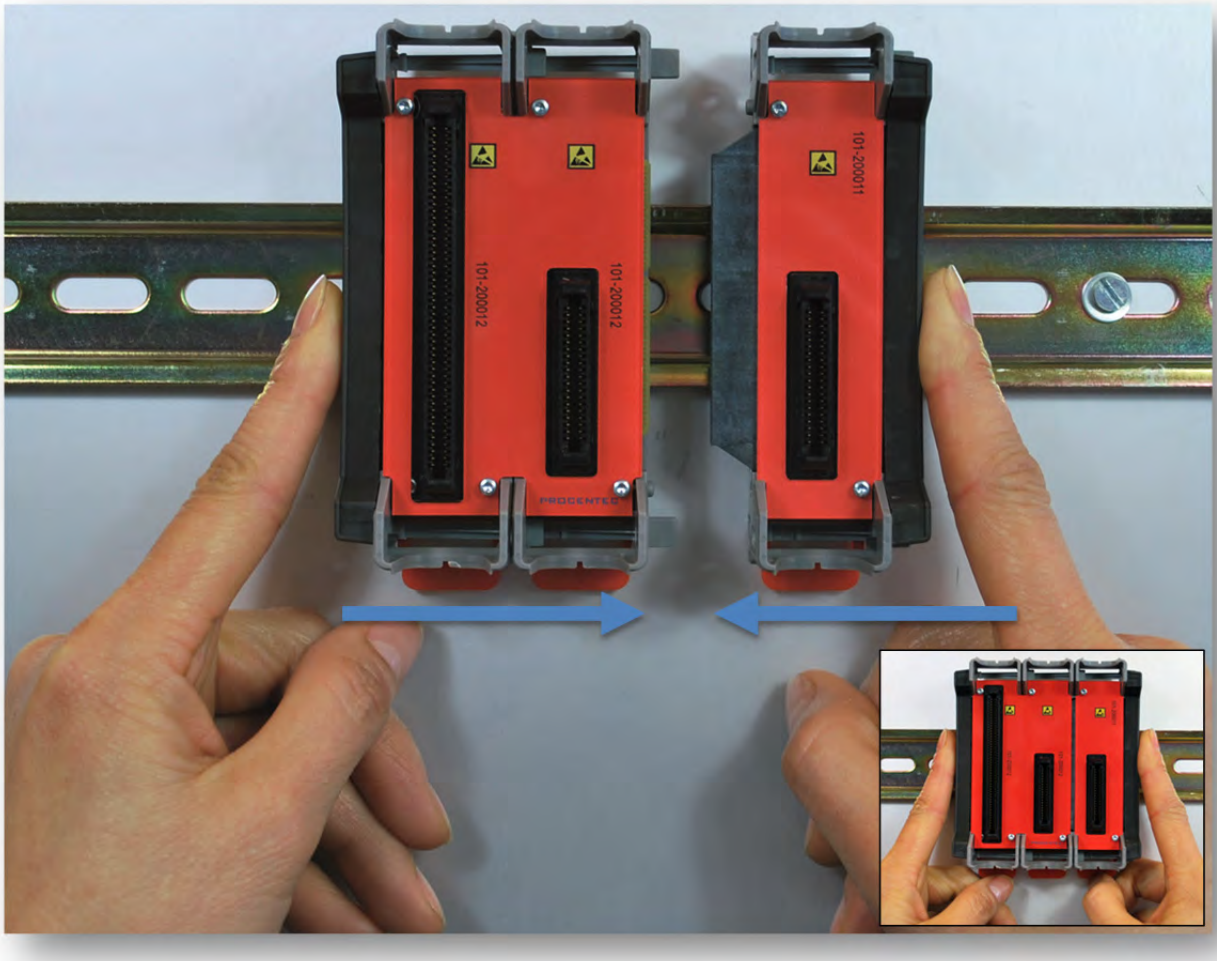

Fig. 8 - Adding backplane units

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3.5 Detaching backplane units

Detaching backplane units is a delicate procedure that should be done according the description below and **Fig. 9** in order to prevent damages.

Do not add or remove backplane units while the backplane is powered!
This can cause serious damage to the COMbricks set.

STEP 1:	Push the top arm down with a screwdriver and delicately pull the top of the backplane unit that has to be removed. The arm should now be unlocked.
STEP 2:	Push the bottom arm down with a screwdriver and delicately slide the bottom of the backplane that has to be removed. The arm should now be unlocked.
STEP 3:	Slide the backplane unit away from the section that remains.

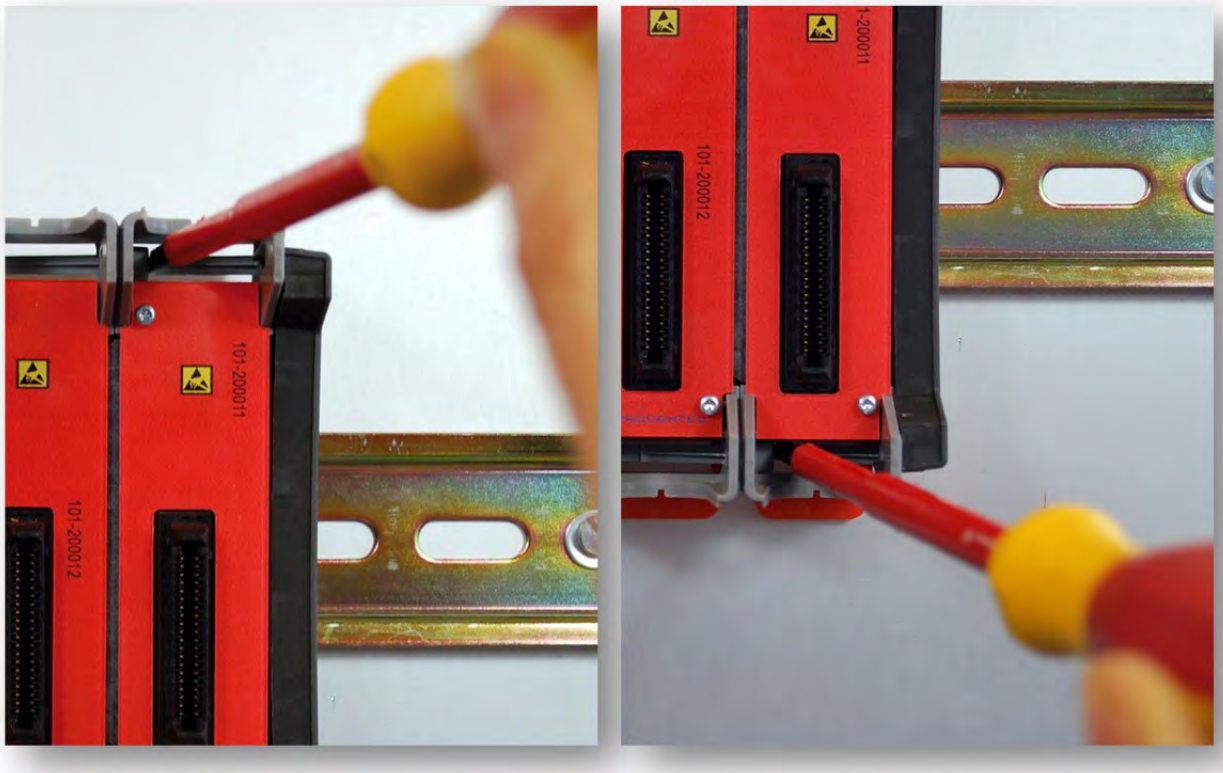

Fig. 9 - Detaching backplane units

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3.6 Inserting modules

Push and click the modules in the slots of the backplane (see **Fig. 10**).

The Head Station (with the red front plate) should be placed in the most left slot (with the largest connector) and the other modules in the remaining slots.

When the modules are inserted the correct way, a sharp clicking sound should be heard during the push.

Modules can be inserted during operation.

The slots have a polarity and fit only one way.

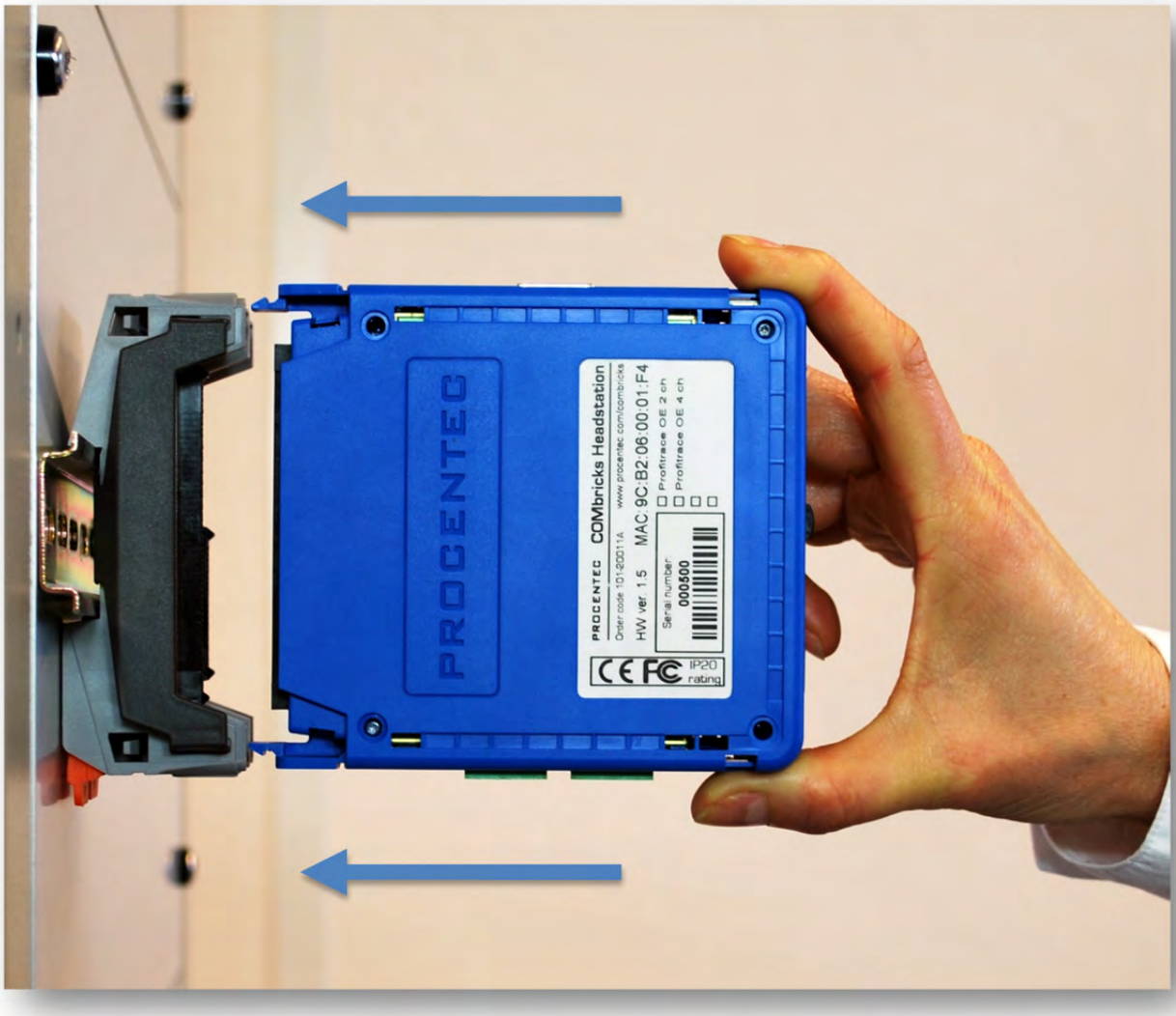

Fig. 10 - Inserting modules

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3.7 Removing modules

To remove a module press the keys on both sides of the module (this has to be done with 2 hands). When both keys are pressed, pull the module out of the slot (see **Fig. 11**).

Modules can be removed during operation.

1 Slot between 2 modules can remain empty when modules are removed during operation. Modules at the end of the backplane can always be removed (1-by-1).

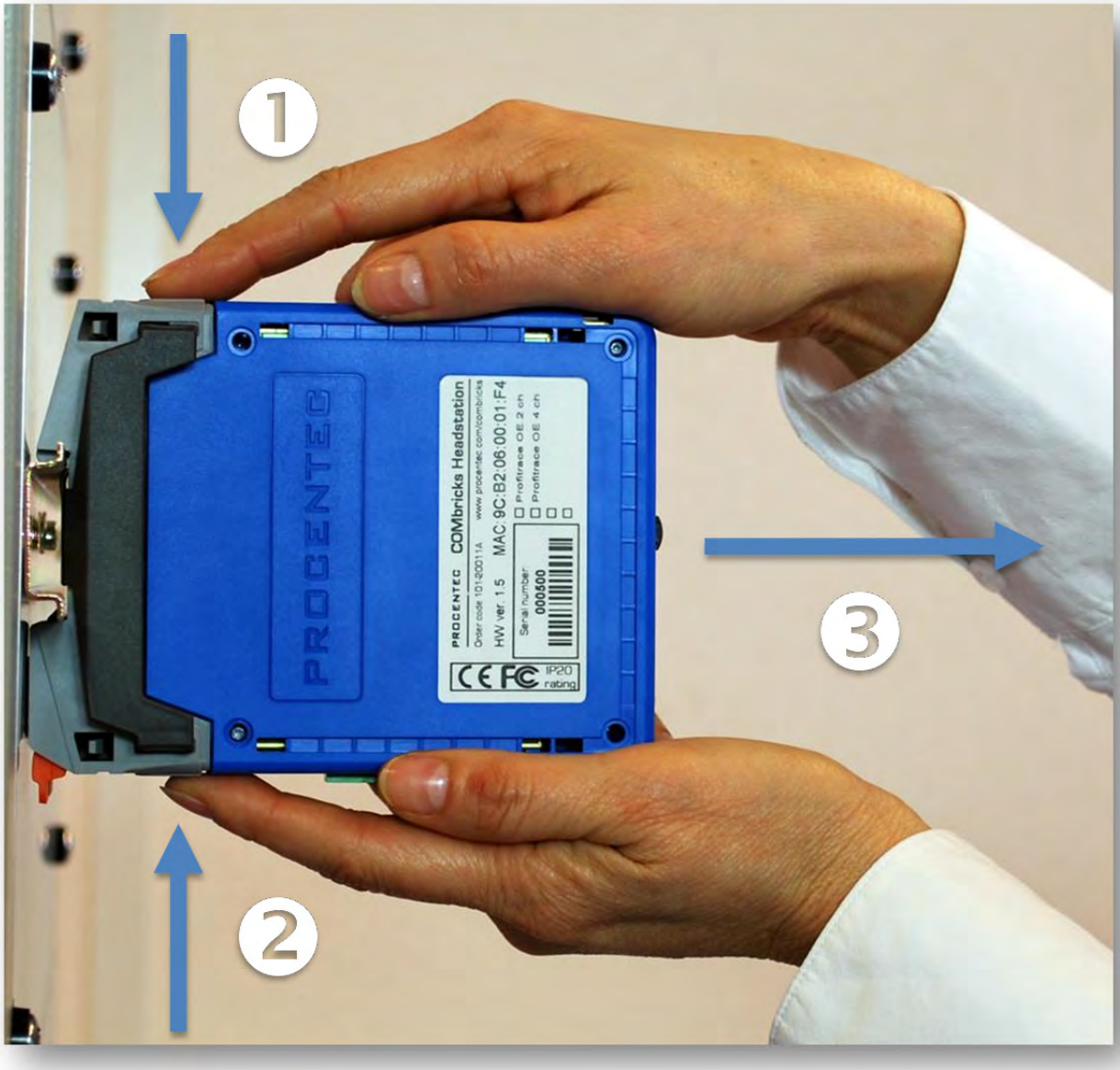

Fig. 11 - Removing modules

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3.8 Wiring Ethernet

The Ethernet connector is located on the top-side of the Head Station. The connector contains LEDs that indicate linkup (green) and reception of data (orange).

It is recommended to use a cable/RJ45 plug with grounding/foil due to the nature of industrial applications.

The Ethernet interface complies with standard Ethernet guidelines. The maximum cable length from COMbricks to switch/device is 100 meter.

The MAC address is printed on the side of the Head Station.

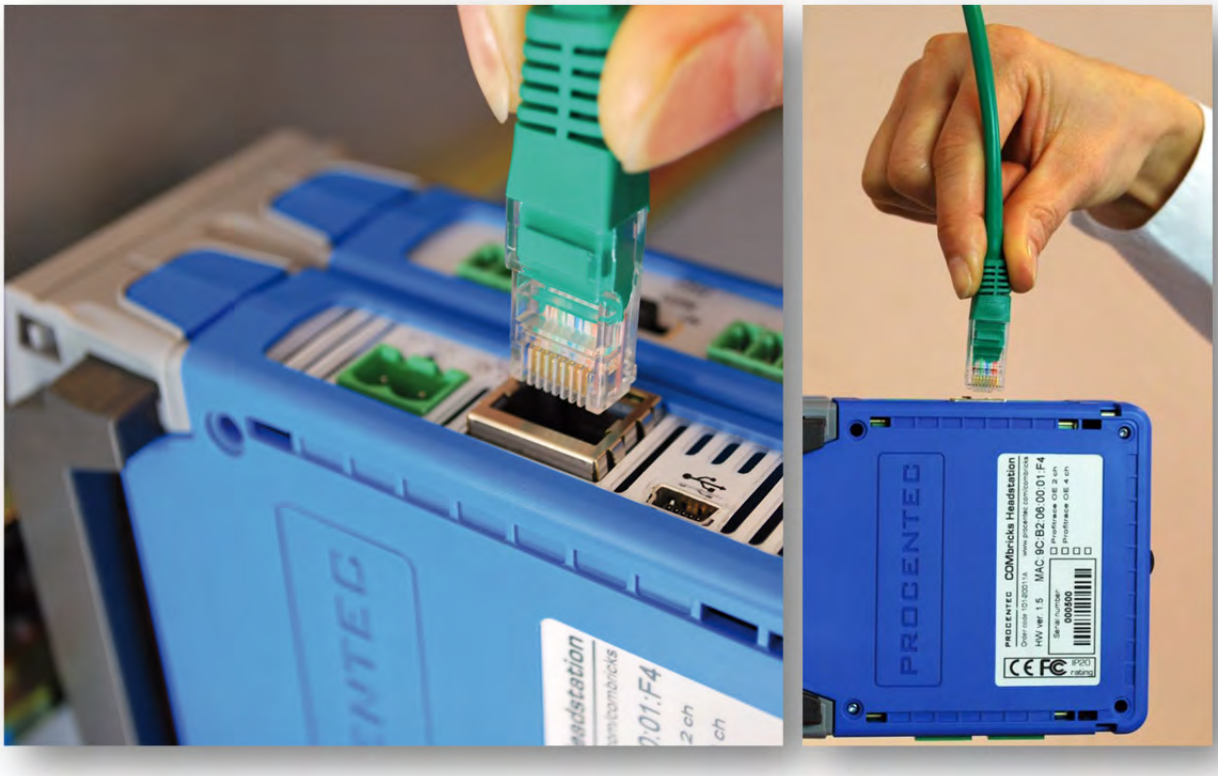

Fig. 12 - Wiring Ethernet

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3.9 Power Supply

The Head Station contains two 3-pin screw type power connectors on the bottom. If power redundancy is NOT required, either one can be used.

The layout is as follows (when the wires are pointing down):

1 = **-** (left)

2 = **+** (middle)

3 = **SH** (right)

The power supply must comply with the following specifications:

- Voltage: **10.8 .. 26.4 VDC**
- Current: **Min. 800 mA**
- Wire diameter: **< 2.5 mm^2**

3.9.1 Procedure

To connect the 24 VDC supply to the 3-pin screw-type terminal, proceed as follows:

STEP 1:	Strip the insulation of the conductors of the 24 VDC power supply.
STEP 2:	Secure the conductors in the screw-type terminal.
STEP 3:	Insert the entire connector block in the power socket (see **Fig. 13**).

To connect the power supply a 3 mm screwdriver is required.

3.9.2 Testing and commissioning

If the power is switched ON it can be diagnosed by the following indicator procedure:

- ❑ All LEDs on the Head Station should be shortly ON.
- ❑ The RDY LED should be shortly Blinking.
- ❑ The SD LED should be ON (if an SD card is inserted).
- ❑ The RDY LED should be ON (also on other inserted Modules).

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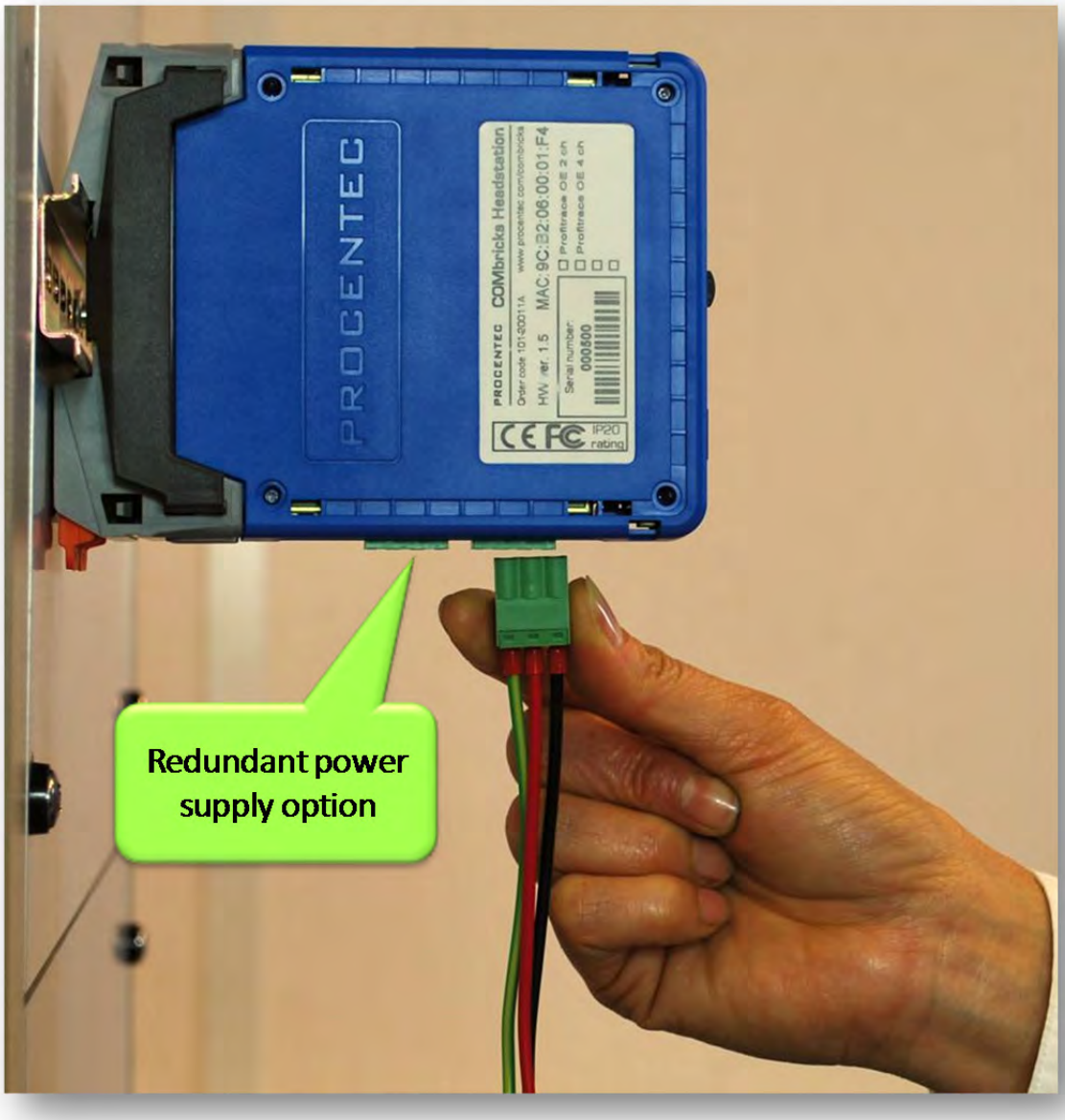

Fig. 13 - Head Station power supply

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4 Web server

To access the web server of COMbricks, open your web browser and enter the IP address that has been setup (after purchase or reset the default IP address is 192.168.1.254)**. In the Discovery Tool you can find a button to access the web server with the default Windows browser.**

If a User password has been setup a screen will appear to login first in order to access the web server. If only the Administrator password has been setup it is not necessary to login to directly, but when settings are altered you must be logged in (See **Paragraph 4.7**).

Some web pages described in this manual are only accessible with certain Head Station types, licenses or firmware versions.

After the web page has been loaded, the pages of the web server can be browsed by clicking on the items in the menu on the left side of the screen. The next paragraphs will explain the primary web server pages.

The web server can handle 20 simultaneous client connections. When all 20 are utilized, the connection with the COMbricks could become relatively slow.

The minimum version requirements for Web browsers are:
- Firefox 2.0 (24 October 2006)
- Internet Explorer 6.0 (27 Augustus 2001)
- Google Chrome 1.0 (24 April 2009)

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4.1 Status

Head Stations: **1A, 1B, 1C**
Firmware: **V1.140 and higher**
Login: **User or Administrator**

The 'Status' screen is the first web page that appears when the web server is accessed. This page gives an overview of the available modules and their respective description + version numbers (see **Fig. 14**).

Modules can be inserted and removed during operation. Changes in hardware should be directly visible in the Status screen.

The 'User message' with custom messages/info is also displayed here (see **Fig. 14**).

On the top of the screen the network and site info can be inspected (see **Fig. 14**).

On the bottom of the screen the connected clients with this COMbricks are visible (see **Fig. 14**).

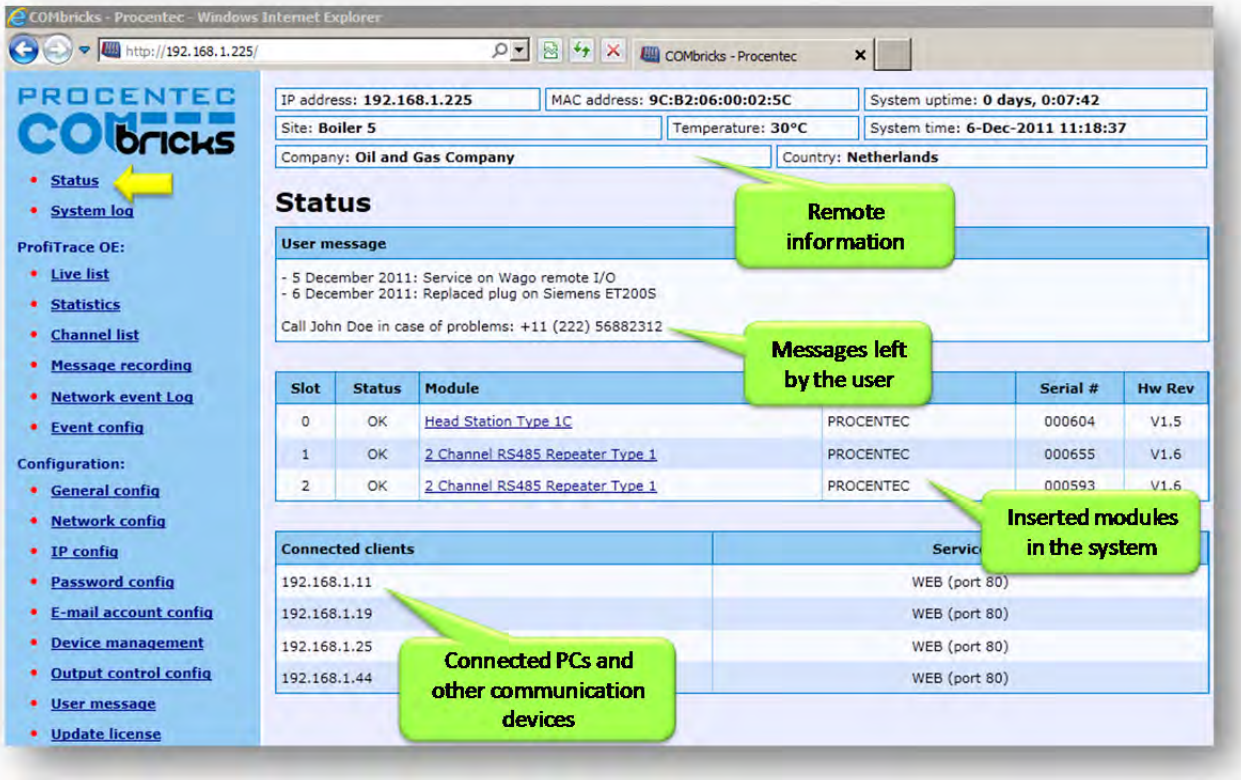

Fig. 14 - Status screen

Most of the module types offer their specific status screen. Click on the link (name in the module column) and the respective web page will be displayed (see **Fig. 15**).

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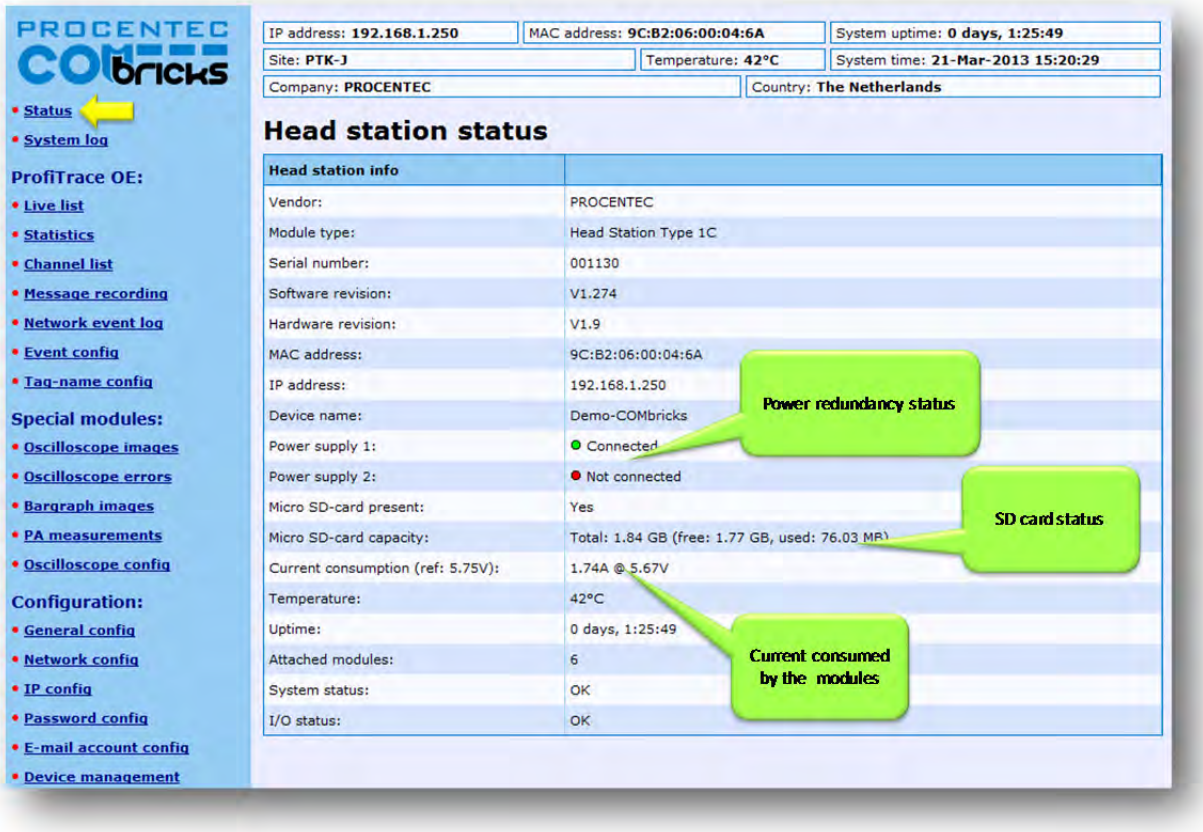

Fig. 15 - Example of a module status

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4.2 Channel list

Head Stations: **1A, 1B, 1C**
Firmware: **V1.152 and higher**
Login: **User or Administrator**

A helpful utility is the Channel list. This page visualizes a graphical overview of all stations in the network and to which network module they are connected. It is almost comparable with a logical topology scan (see **Fig. 16**).

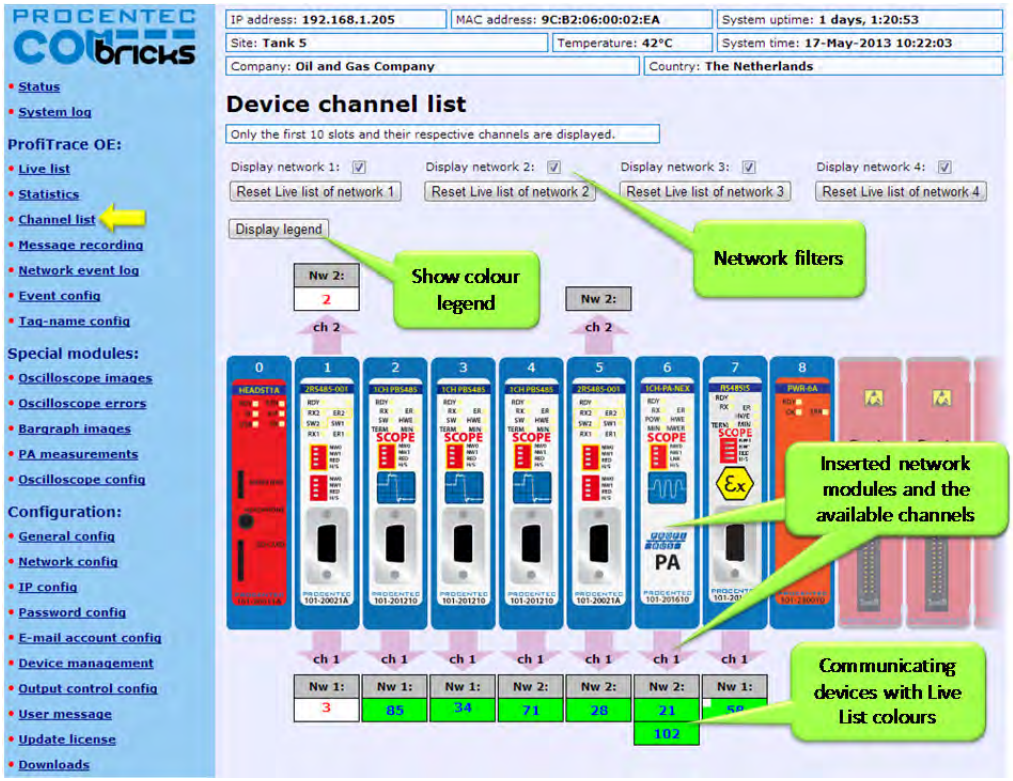

Fig. 16 - Channel list

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4.3 System log

Head Stations: **1A, 1B, 1C**
Firmware: **V1.140 and higher**
Login: **User or Administrator**

The system log saves COMbricks events. When this page is accessed all the COMbricks events are displayed. It can be downloaded as text file and cleared/deleted (see **Fig. 17**). You cannot change the system log in the web server.

The 'System log' is;

- **kept intact** after a power down and continues its logs after a power-up.
- **auto/live updating** when this screen is accessed.
- **saved** on the SD card.

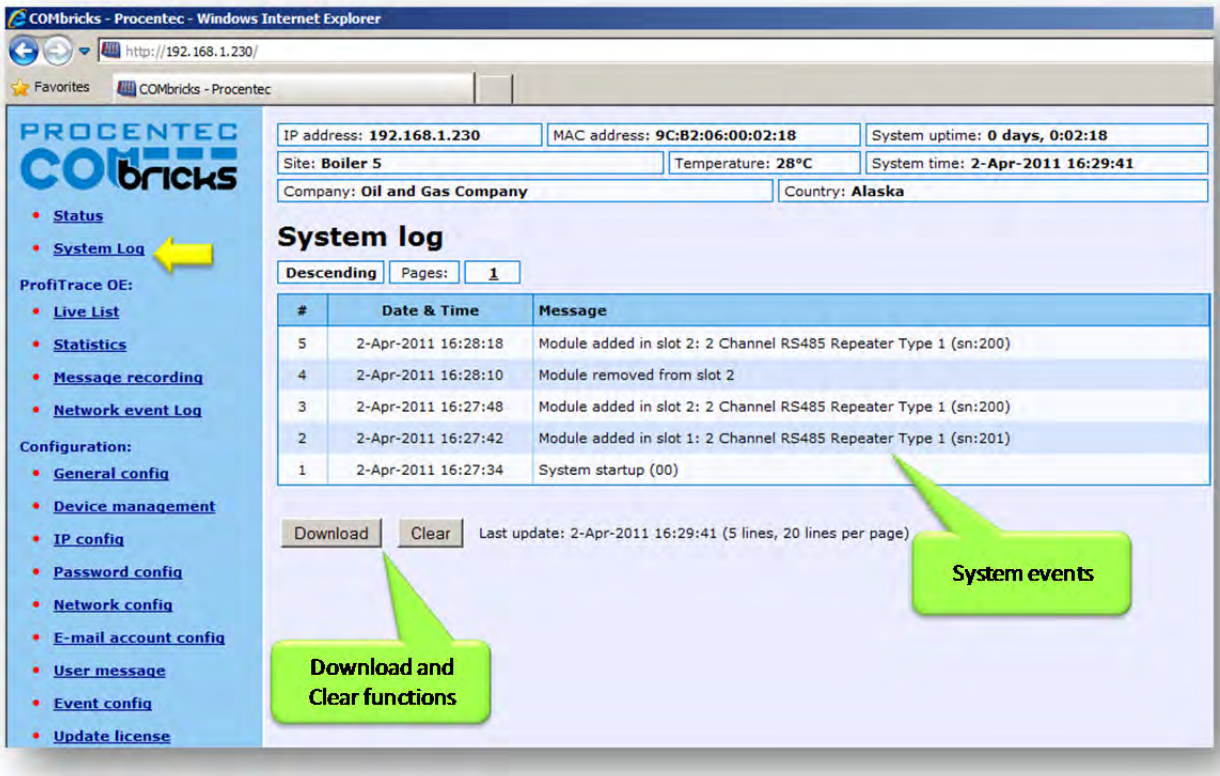

Fig. 17 - System log

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4.4 General configuration

Head Stations: **1A, 1B, 1C**
Firmware: **V1.140 and higher**
Login: **Administrator**

The basic settings of the COMbricks are customized on the 'General configuration' page. For optimal use of ProfiTrace OE, it is important that the time is synchronized and the site info is sufficiently filled in (see **Fig. 18**). If your COMbricks is connected to Internet or a local NTP server, use the NTP server synchronization for automatic date & time update. This keeps your COMbricks always set to the right time (this option is available in Head Station firmware v1.278 and up). If the COMbricks clock differs more than 10 seconds from the NTP clock, a line in the system log is added.

The automatic time update occurs when the set interval has passed. The maximum interval that can be set is 1440 minutes, which corresponds to 24 hours. Please note that there is no option for auto-updating to Daylight Saving Time (DST). This is because this is not used in Factory Automation. When an NTP server is used, the time is always assumed to be winter time.

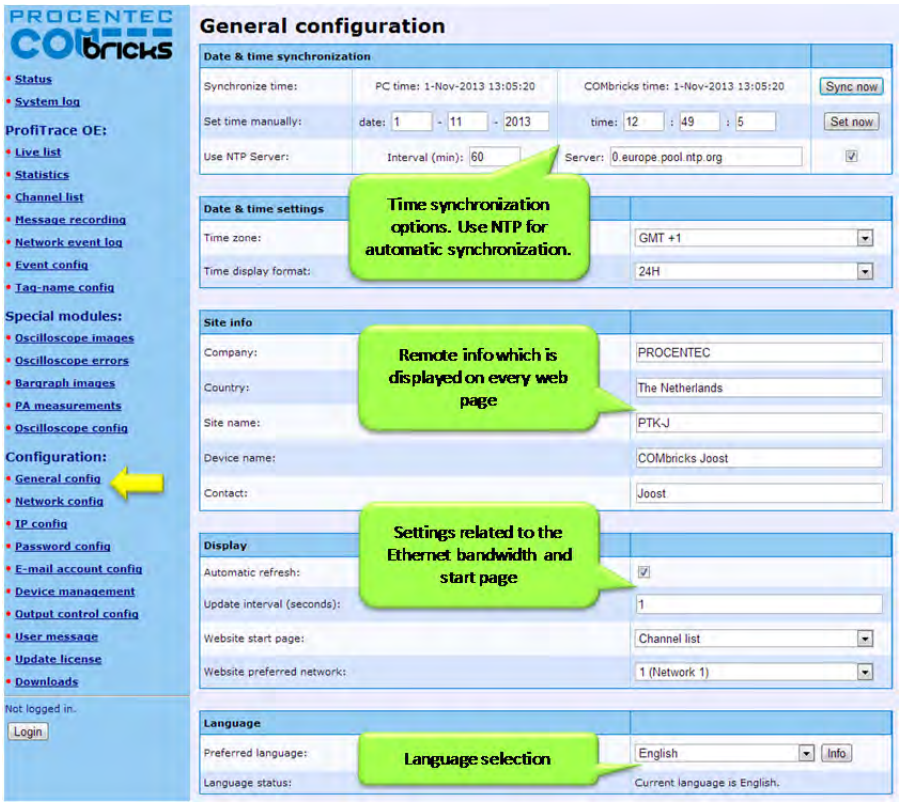

Fig. 18 - General configuration

The display refresh rate has to be tuned to the bandwidth of the Ethernet connection. By default it is set to a 1 second automatic refresh. If the bandwidth is limited, it is recommended to increase this time or to switch the automatic refresh OFF (see **Fig. 18**).

It is possible to select the start page which is first displayed when browsing to the Head Station IP address. You can select the Main Status page, System Log page, Live List, Statistics, Channel list Message Recording or Network Event log. You can also select for which network this should apply.

The interface language can be changed in the Preferred Language drop-down box.
More languages will be added in the future, which will become available in new firmware updates.

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4.5 Network configuration

Head Stations: **1A, 1B, 1C**
Firmware: **V1.252 and higher**
Login: **Administrator**

The network names and the assignment of the repeater modules are customized here. For optimal use of ProfiTrace OE, it is important that correct and understandable network names are defined (see **Fig. 19**). The network names are used in multiple components: ProfiTrace Live List, event emails, message recording, etc.

Each of the 4 Live Lists can be individually setup to a different time-out. The default value is 5 seconds. The time indicates how long a slave will be displayed as green when it has lost communication to the master. After the set time it will turn yellow if it has no communication anymore.

The network assignment of the repeater modules is also displayed and can be adjusted if software settings are enabled (see **Fig. 19**). It is possible to assign a module to Network 1 to 4, or to disconnect it from the backplanes. This makes it possible to create a multiplexed system, or temporarily remove certain slaves from the PROFIBUS network.

Dipswitch settings are always primary to software settings.

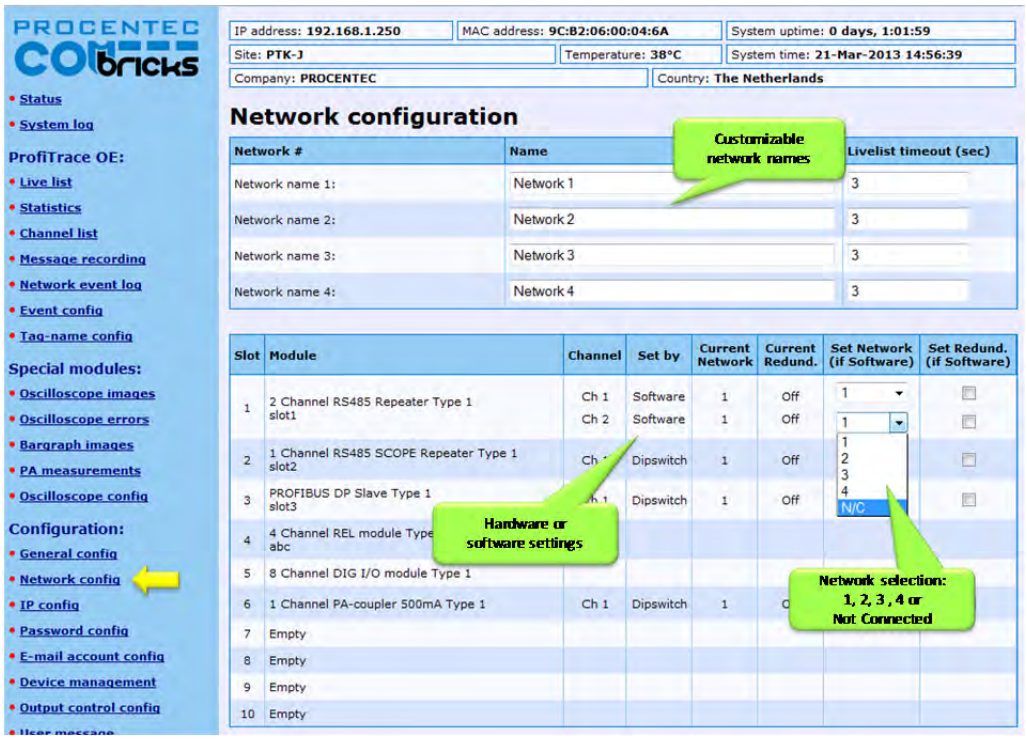

Fig. 19 - Network configuration

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4.6 Output Control

Head Stations: **1A, 1B, 1C**
Firmware: **V1.254 and higher**
Login: **User**

With the Output Control feature the user can directly respond to an event with the onboard relay in the Head Station or the channels from output modules in the backplane. The web server offers 10 customizable controls that can be set to the following behavior:

- Not active
- Manual ON/OFF — Live toggle of the output channels
- Time — Time ON and Time OFF
- FF event — Bus voltage too low, FF failure, etc.
- System event — Redundant power change or COMbricks failures

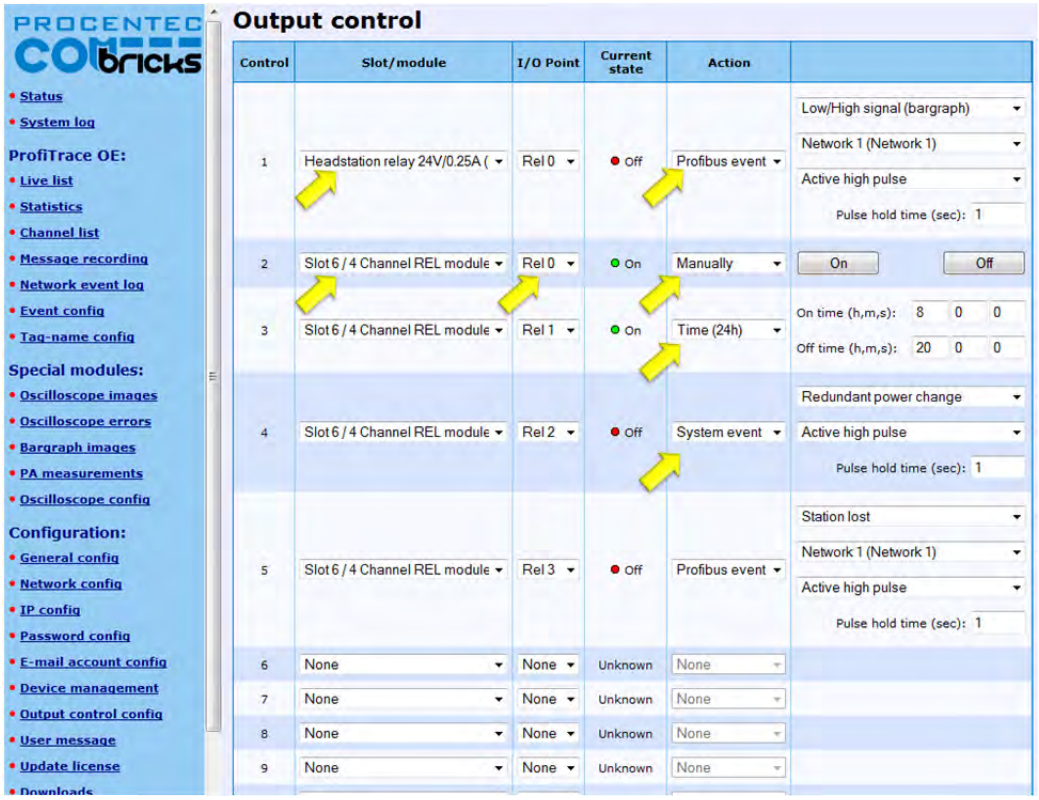

Fig. 20 - Output Control

After power down/up, the COMbricks loads and restores these settings.

It is recommended to have a security policy concerning passwords with this feature, because the user is able to control REAL output points.

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4.7 Password setup and login

Head Stations: **1A, 1B, 1C**
Firmware: **V1.100 and higher**
Login: **Administrator**

Passwords are NOT activated when the product is purchased or reset and all menu items are accessible and adjustable.

COMbricks supports 2 types of passwords;

User	Is limited to read information.
Administrator	Has access to the full web server and can adjust settings.

- The Administrator password has to be set first.
- The passwords can have a length between 1 and 16 characters.

Fig. 21 illustrates the password setup web page.

4.7.1 Access rights

After a password(s) has been setup, it complies with the access rights from **Table 1**.

Table 1 - Access rights after password setup

	NO Passwords	Administrator	User (Admin. is set)
Login required at web server access	NO	NO[1]	YES
Visiting web pages	YES	YES	YES
Clear "System log"	YES	YES	YES
Restart the device in the "Device management"	YES	YES	YES
Output Control	YES	YES	YES

[1] When only the Administrator login has been activated, the user can always enter the web server without a valid login. When settings need to be altered, the administrator is required to login.

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	NO Passwords	Administrator	User (Admin. is set)
Changing passwords	YES	YES	NO
Adjusting all other settings	YES	YES	NO

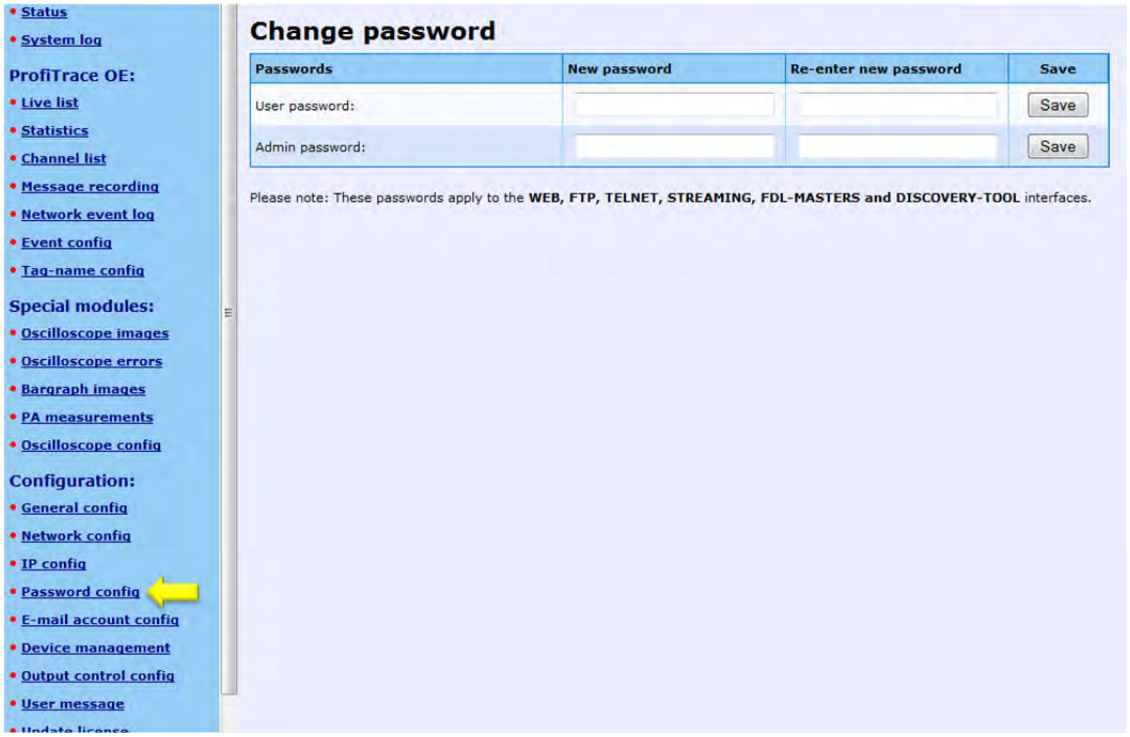

Fig. 21 - Password setup

4.7.2 Password best practice

We encourage you to at least setup the Administrator password if more than 1 person has access to the network.

- Activate the password(s) immediately after installation or at the office before it is transported to the final destination.
- Use different passwords for the Administrator and User.
- Never share passwords with anyone.
- Always use strong passwords. Avoid: *test, 123456, <your company name>, <your first name>, combricks, procentec, etc.*
- Change passwords immediately if they may have been compromised.
- If passwords must be written down, store it in a secure place and destroy it when it is no longer needed.

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- Be careful about where passwords are saved on computers. Some dialog boxes, such as those for remote access, present an option to save or remember passwords. Selecting this option poses a potential security threat.

4.7.3 External protocols

The following login information is required for external protocols, for example for FTP and TELNET.

Login name: **user** or **admin**
Password: <**your password>**

In case no password has been setup, COMbricks will accept any password during the connection phase.

4.7.4 Clearing password(s)

There are 3 ways to restore the password(s) to their default setting:

- Change the passwords with no text written in the text field (*Administrator login required*).
- Restore to factory default settings in the "Device management" page (*Administrator login required*).
- Restore to factory default settings with the switch on the front of the Head Station (see **Paragraph 6.4**).

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4.8 License update

Head Stations: **1A, 1B, 1C**
Firmware: **V1.252 and higher**
Login: **Administrator**

In case the user wants to update the license of the Head Station, it can be done here via an internet connection or copy the content of a license file.

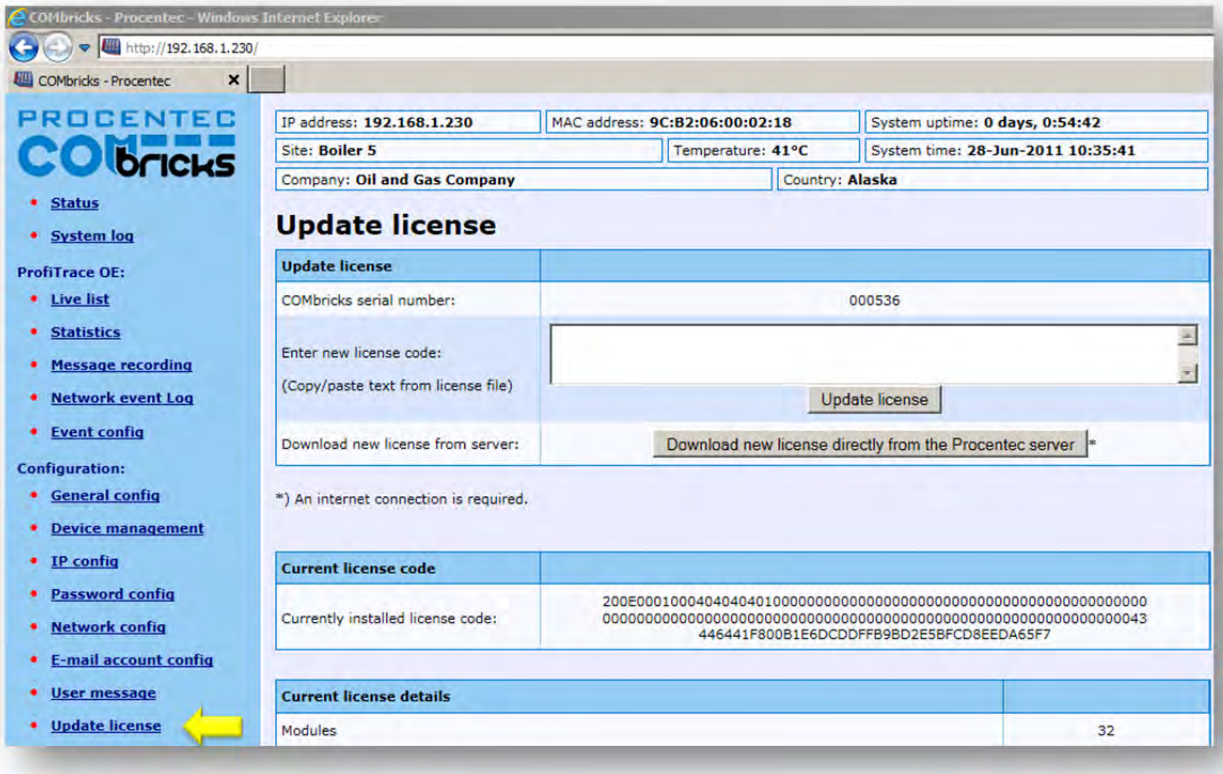

Fig. 22 - License update

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4.9 Document download page

Head Stations: **1A, 1B, 1C**
Firmware: **V1.253 and higher**
Login: **User or Administrator**

To provide the user with documentation, firmware and software, the SD card has been provided with a document download page (see **Fig. 23**).

- Download the latest version of the document download page from www.procentec.com
- The content of the *.ZIP* file has to be copied to a directory *\DOC* on the SD card.
- If the directory does NOT exist, create it and copy the content of the *.ZIP* file to it.
- Reload the web server to update the information.
- There should be an item called "Downloads" on the bottom of the left menu

It is possible to replace the PROCENTEC download page with a customized version. Replace *index.html* with your own version and you can point to directories/files which are located on the SD card. If you are interested in such activities, we recommend you to inspect the structure of the PROCENTEC index.html first.

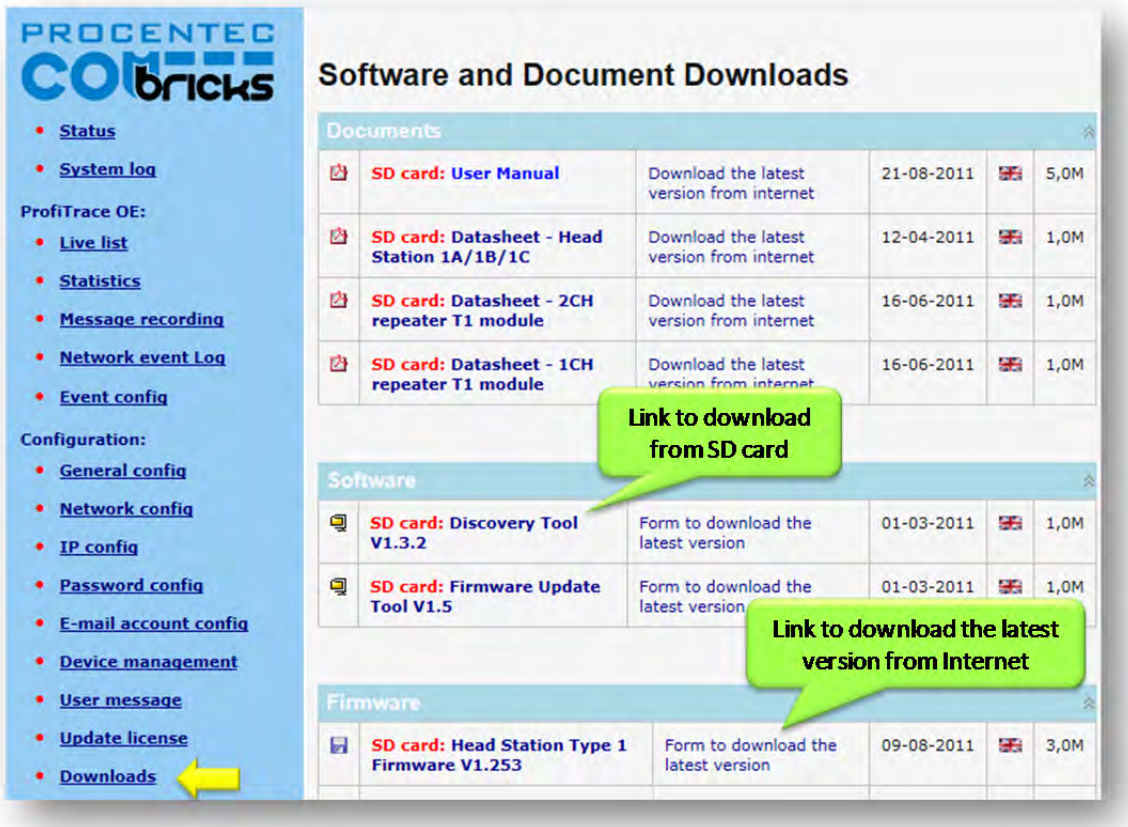

Fig. 23 - Software and document downloads

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4.10 Email account config

Head Stations: **1A, 1B, 1C**
Firmware: **V1.253 and higher**
Login: **Administrator**

The email account information has to be entered if the user wants to have COMbricks signal events by email. The required information is generally the same as any other email related setup (see **Fig. 24**).

Setting up the email server parameters is not enough. The events that generate the emails have to be setup in the Event config menu (see **Paragraph 5.1**).

The SMTP server has to support **unencrypted** connections, because the current COMbricks firmware does NOT support encrypted connections such as SSL/TLS. The DNS address (IP config menu) has to be modified according to the DNS addresses of your internet provider.

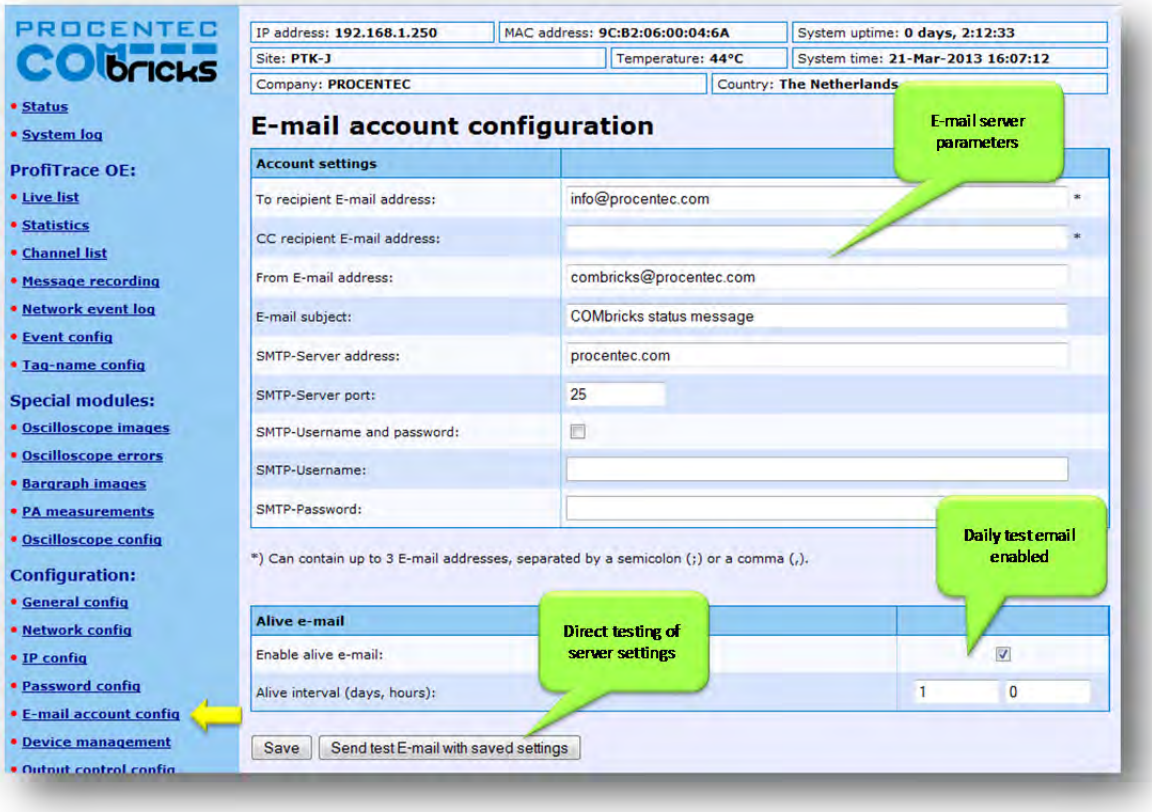

Fig. 24 - Email configuration

The server parameters have to comply with the email server parameters listed in **Table 2**.

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Table 2 - Email server parameters

Server parameters	Mandatory	Additional information	Size
To	YES	If you enter multiple addresses (max. 3) separate them with the ; character.	200
Cc	Optional	If you enter multiple addresses (max. 3) separate them with the ; character.	200
From	Yes	Depending on the email server you are using, this has to be an existing email address.	100
Subject	Optional	Can be anything you want it to be.	100
SMTP server	Yes	Has to be setup according to the requirements of the email server.	100
SMTP server port	Yes	Standard value for most servers has already been entered, but has to be setup according to the requirements of the email server.	
User name	Optional	A User name can be entered if the SMTP server requires it. Click on "SMTP-Username and password" first.	50
Password	Optional	A password can be entered if the SMTP server requires it. Click on "SMTP-Username and password" first.	50

When you have filled in all server parameters, click on "Save". The settings can be tested by clicking on "Send test email with saved settings".

Save the settings first before sending the test email!
It might take a couple of minutes before the test email has been received by the recipient.
If the test-email has not been received, please check if it has been blocked by a Spam filter.

4.10.1 Alive email

COMbricks can send a periodic alive-email to the recipient(s) entered in the To: field. If no events are triggered for a longer period, COMbricks will not send emails. This also happens when COMbricks has no connection to the mail server for some reason. The alive email is the only way of knowing that the connection is still active.

COMbricks can auto-send an email with adjustable intervals of one hour and one day.

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4.10.2 Troubleshooting

- ❑ Check if COMbricks has access to the internet. You can easily test this by going to the Download page in the COMbricks menu and download a datasheet from the web.
- ❑ Compare the DNS settings with the requirements of the email server you are using.
- ❑ Make sure your email server supports unsecured connections.
- ❑ Check the email settings and generate the test email. Start with only 1 email address (To).
- ❑ If the test email works, please check that your events have been correctly enabled and an event is really triggered.

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5 Monitoring over Ethernet

The FF monitoring kit offers most of the useful functionality of regular COMbricks oscilloscope modules.

5.1 Event configuration

For generating emails and entries in the network log, the event configuration has to be set for each network. **Fig. 25** shows an example with multiple event options. Currently only the 'FF Events' are supported in the COMbricks; other events are related to PROFIBUS and not FF.

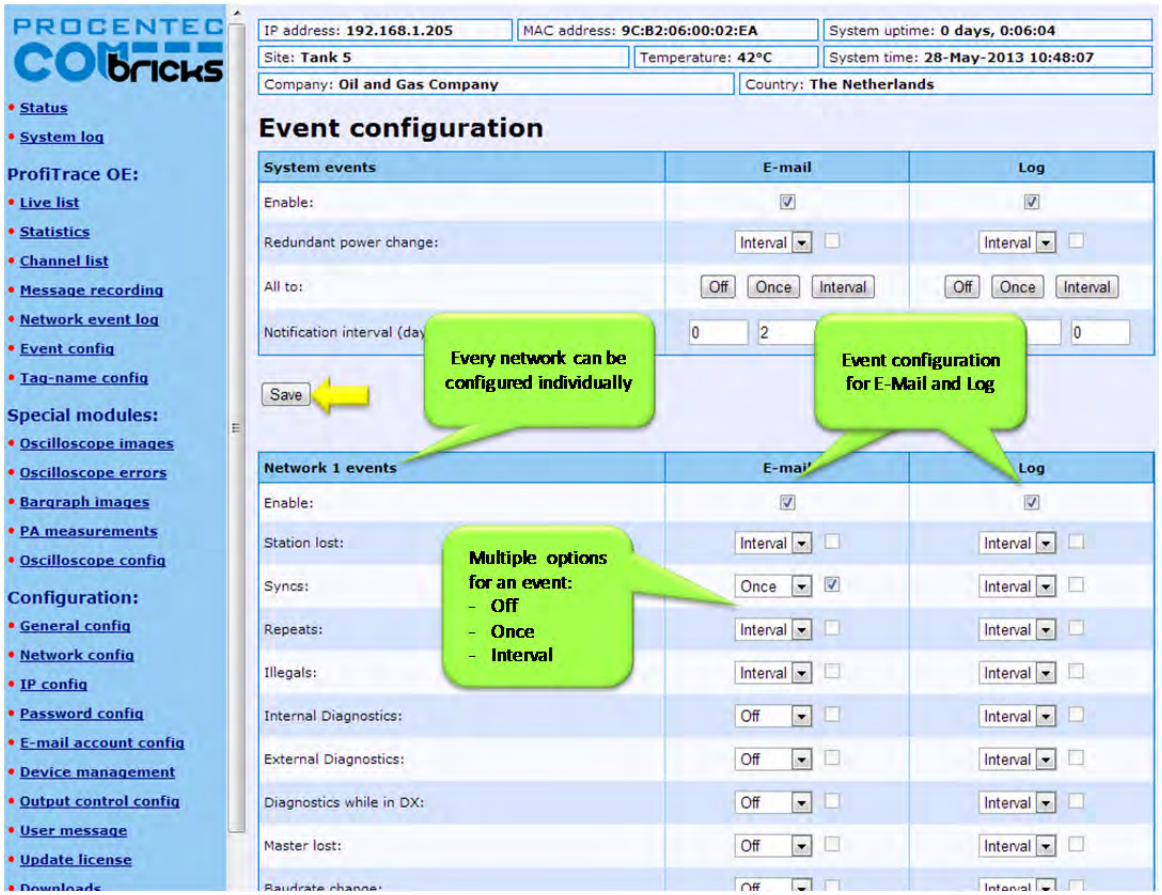

Fig. 25 - Event configuration

To reduce an unwanted overload of emails or log entries, the events can be set to Off, Once or Interval.

Even parameter	Description	Retrigger required
Off	No event generation.	
Once	Event will be generated once (1-shot).	Yes

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Interval	Event will be generated once within the customized interval time. After the interval time the event is automatically retriggered to be generated in the next interval. If no trigger was captured in the new interval period, no event will be generated.	No

The interval time can be customized between 1 minute and 365 days.

5.2 Oscilloscope images

"The easiest FOUNDATION Fieldbus oscilloscope ever....."

The FF modules have an integrated oscilloscope to measure the signal quality of the telegrams. The oscilloscope has an interface with the web server to display the signals from the devices which are connected to its channel. After opening the web page, all oscilloscope signals are displayed and updated live.

The SCOPE repeater is the most easy to use FF oscilloscope available:

- You do NOT have to touch the installation
- Works automatically
- Oscilloscope data is never mistaken with the wrong segment
- No probe wiring
- No spur lines

By clicking on the oscilloscope waveform of a device, the oscilloscope triggers on the respective device and displays its signals in a new page.

The SCOPE repeater is only able to do differential measurements.

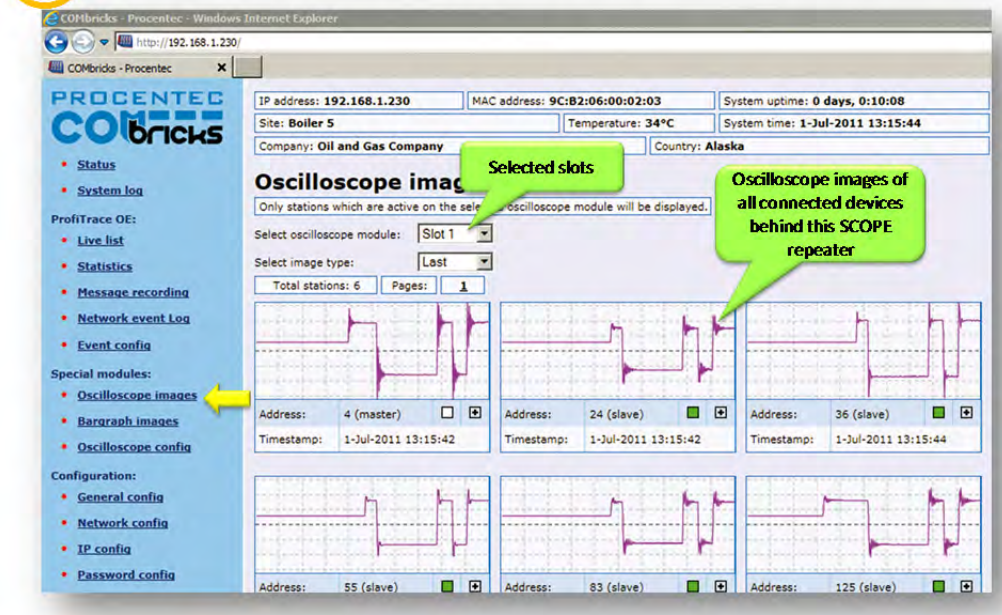

Fig. 26 - Oscilloscope images from all devices

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5.3 Bar graph

The Bar graph illustrates the average signal strength from all available connected devices behind a specific SCOPE repeater. It is a helpful utility to get an impression of the overall signal quality of the network.

On FF, the average amplitude should be around between 750 mV and 1000 mV. When there are bus problems the Bar graph will display different Voltage levels and the color of the bars will change.

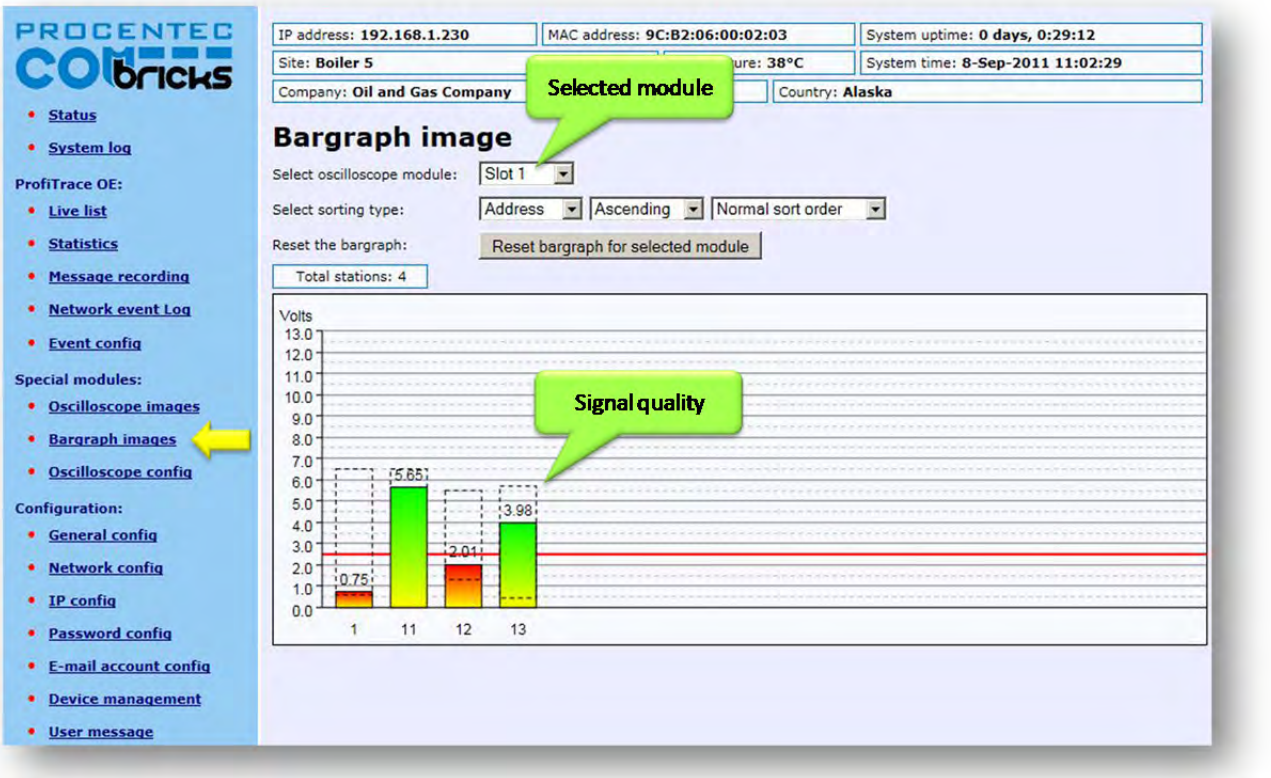

Fig. 27 - Bar graph

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6 Head Station 1A/1B/1C

The Head Station is the primary element of COMbricks and has to be inserted in the most left slot of the fixed backplane socket. It schedules the interaction between all modules and provides data storage and an Ethernet interface for the user.

6.1 Overview

Type 1A is the basic model and ALL Head Stations are hardware technically identical with type 1A.

Type 1B and 1C are enhanced types that contain a ProfiTrace core and advanced web server for permanent remote maintenance of the PROFIBUS installation over Ethernet (hardware is identical as a type 1A).

- Type 1A: NO monitoring capabilities, no streaming, no OPC
- Type 1B: Monitors 1 PROFIBUS network + ProfiTrace 2 streaming + OPC **(since June 2013)**
- Type 1C: Monitors 4 PROFIBUS networks + ProfiTrace 2 streaming + OPC

For the monitoring with ProfiTrace OE, repeater modules or slave modules are required to provide PROFIBUS telegrams on the backplane network.

Head Station type 1B and 1C are able to stream live data directly in the ProfiTrace 2 software package over Ethernet. ProfiTrace 2 will run with full monitoring functionality and the user can benefit from its features.

The Head Station provides power to all modules through its redundant power supply.

Table 3 - Head Station comparison

	Head Station 1C (101-20011C)	Head Station 1B (101-20011B)	Head Station 1A (101-20011A)
Backplane networks (for repeater modules)	4	4	4
Web server	YES	YES	YES
CommDTM / Class 2 master	YES	YES	YES
SNMP	YES	YES	YES
ProfiTrace OE networks (for monitoring)	4 (**ALL networks**)	1 (**network 1**)	-
Oscilloscope features	YES	YES	-

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	Head Station 1C (101-20011C)	Head Station 1B (101-20011B)	Head Station 1A (101-20011A)
ProfiTrace 2 live streaming	YES	YES	-
OPC	YES	YES	-

6.2 Relay contact

With the relay contact it is possible to react on an event (retries, lost, bus voltage too low, etc). It is also possible to control the relay manual or on a timer. Refer to **Paragraph 4.6** for details. The relay is capable of switching 0.5 A - 170 VAC.

6.3 SD card

The SD card is used to store ProfiTrace file recording data, logs, the GSD info file and backup settings.

By default a 2 GB SD card is supplied together with the Head Station, but it can be exchanged by an SD card with a maximum size of 32 GB.

The SD card is addressable directly with an FTP client. In the FTP software the SD card has a drive letter with a directory structure, on which files can be read and written from and to the SD card. When the password is set in the web server, this same password has to be used by the FTP software to establish a connection.

6.3.1 Inserting/replacing the SD card

The socket is located on the front plate of the Head Station.

To remove the SD card, gently press it inwards. The SD card is unlocked and released from the socket.

With insertion, just insert the SD card in the socket and press it inwards. The SD card socket has a polarity to make sure it is not inserted backwards.

The SD card is hot swappable, but there is a risk that monitoring data is lost when the system wants to write at exactly the same time as the removal or insertion.

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6.3.2 Life cycle of the SD card

The life of a SD card depends on the following factors:
- Number of read and write operations
- Ambient temperature

At an ambient temperature of up to 60 °C the SD card has a service life of 10-years at maximum 100000 write/delete sequences.

If the maximum number of read and write operations has exceeded the limits, data loss may be possible.

6.3.3 Directories and files

The following directories have been standardized for COMbricks and are in most cases located on the SD card;

Directories	Description
/Busmon	ProfiTrace message recoding files (Head Station type 1B and 1C only)
/Log	Log files
/Doc	Contains the web server download page (See **Paragraph 4.9** on how to set it up)

Files and extensions	Description
Journal.DAT	System file (Do not delete or remove it)
SETTINGS.INI	Head Station settings (IP address, name, location, etc.)
LICxxxxxxx.TXT	License files
.PTC	ProfiTrace OE message recoding files. (located in the "*Busmon*" directory). The files can be opened with ProfiTrace V2.5.3 and higher (See **Paragraph Error! Reference source not found.** on how to generate PTC files).
.PKG	Firmware files
.CSV	Log files (located in the "*Log*" directory)

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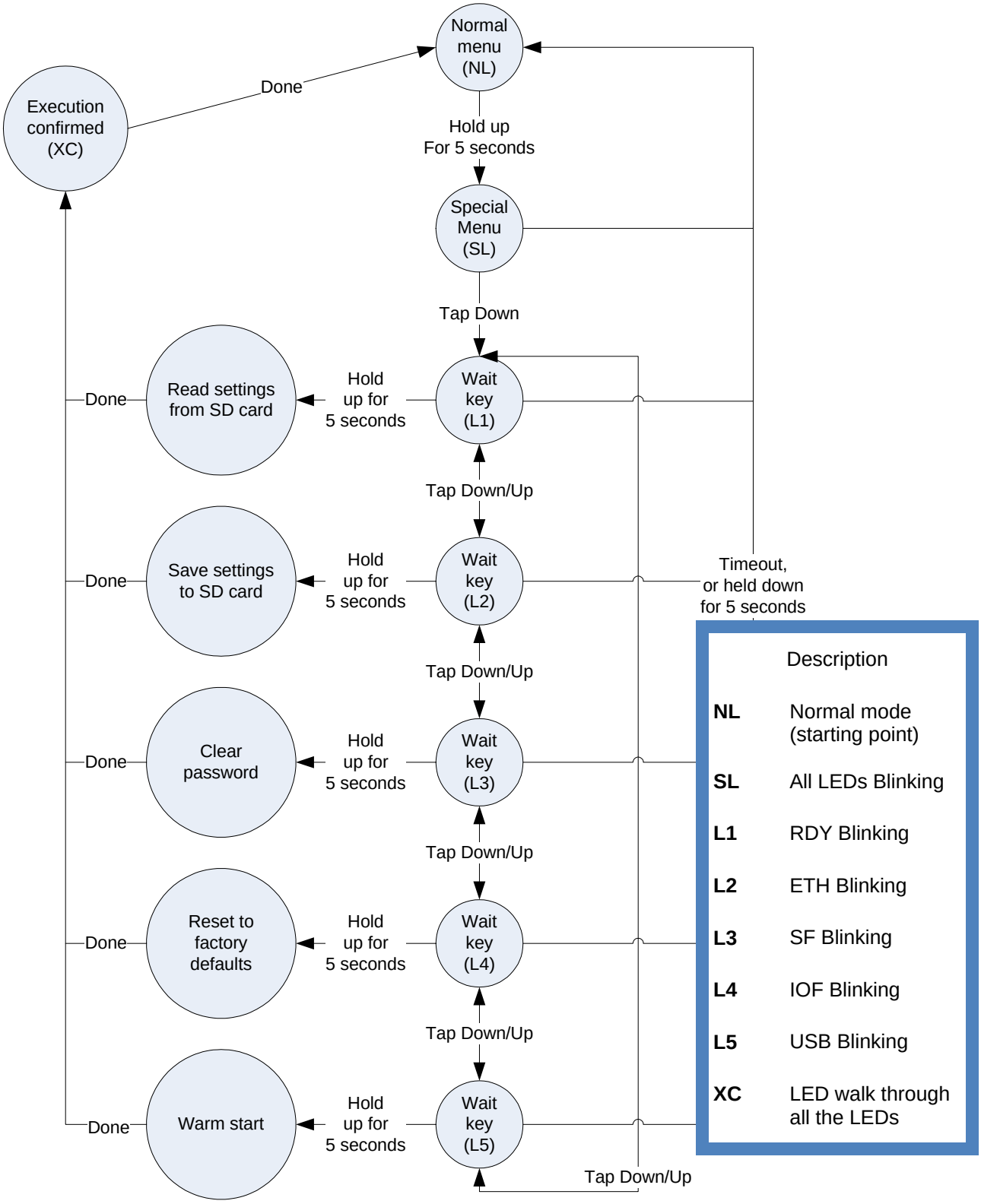
6.4 Switch navigation of the Head Station 1A/1B/1C



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6.5 LEDs on the Head Station

In the tables below the LEDs of the Head Stations during normal operation are described. The LED conditions in firmware update and menu mode are not described here.

RDY - Ready	OFF	Blinking	ON
Starting up		X	
Run			X

ETH - Ethernet	OFF	Blinking	ON
No Ethernet link established	X		
DHCP configuration is pending		X	
Ethernet link established			X

SF - System failure on the Head Station	OFF	Blinking	ON
OK	X		
Backplane voltage too low (under 5,5 VDC) or current draw to high (above 2,5 A)		Fast	
Clock-chip error ***(contact your local Distributor or PROCENTEC)***		Slow	
Internal component or firmware error ***(contact your local Distributor or PROCENTEC)***			X

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IOF - Failure on modules	OFF	Blinking	ON
OK	X		
High speed module in slot 11-32			X
More than 32 modules found			X
Module NOT identified			X

USB - Mini USB connecting	OFF	Blinking	ON
No USB connection	X		
USB connection			X

SD card	OFF	Blinking	ON
No SD card inserted	X		
SD card inserted (activity)		X	
SD card inserted (no activity)			X

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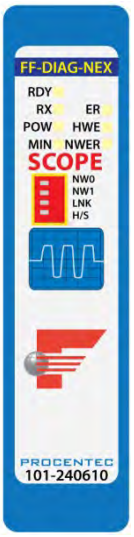
7 FOUNDATION Fieldbus Diagnostics module

FOUNDATION Fieldbus network diagnostics has never been so open and easy. The COMbricks Diagnostic Module is able to permanently check the condition of the H1 physical layer. By means of a web server the signal quality of the connected devices can be inspected and emails inform the user about critical events. Notifications and remote access assure an optimal network uptime and reduced maintenance costs.



The COMbricks FOUNDATION Fieldbus Diagnostics Module is not an active device and therefor does not require an address. It passively measures the network condition and can be wired parallel or series to/in an existing H1 segment.

FF modules can be combined with PROFIBUS DP and PA diagnostics modules to offer a complete installation overview to the user.

COMbricks is able to carry 10 FF modules. It can also be a customized mix of FF modules with other communication modules.

This module is not suitable for use in Ex environments unless a barrier is used between the FF module and the Ex zone.

7.1 Quick Start checklist

This checklist lists all the steps to a quick usage of the FF module in Link or Coupler mode. It is assumed that a running COMbricks set with at least one DP repeater module or fiber optic coupler module is already active.

STEP 1:	Provide the Head Station 1B or 1C with the latest firmware, at least v1.281.	(**7**)
STEP 2:	Add an empty backplane slot to the COMbricks set.	(**2.2**)
STEP 3:	Insert the FF module in the empty slot.	**(2.3)**
STEP 4:	Check the Channel List (in web browser) to see if the FF module appears.	**(4.2)**
STEP 5:	Check the status page of the FF module: Current consumption ± 10mA?	**(7.3.1)**
STEP 6:	Connect the FF trunk cable to FF power supply and station(s).	**(7.2.1)**
STEP 7:	Check the status page of the FF module: Current consumption increased?	**(7.3.1)**
STEP 8:	Check the Scope Signals of the FF trunk.	**(7.3.2)**
[optional]		
STEP 9:	Connect the FF cable coming from the FF power supply to the top of the module. DC measurements visible in FF measurements screen?	**(7.3.2)**

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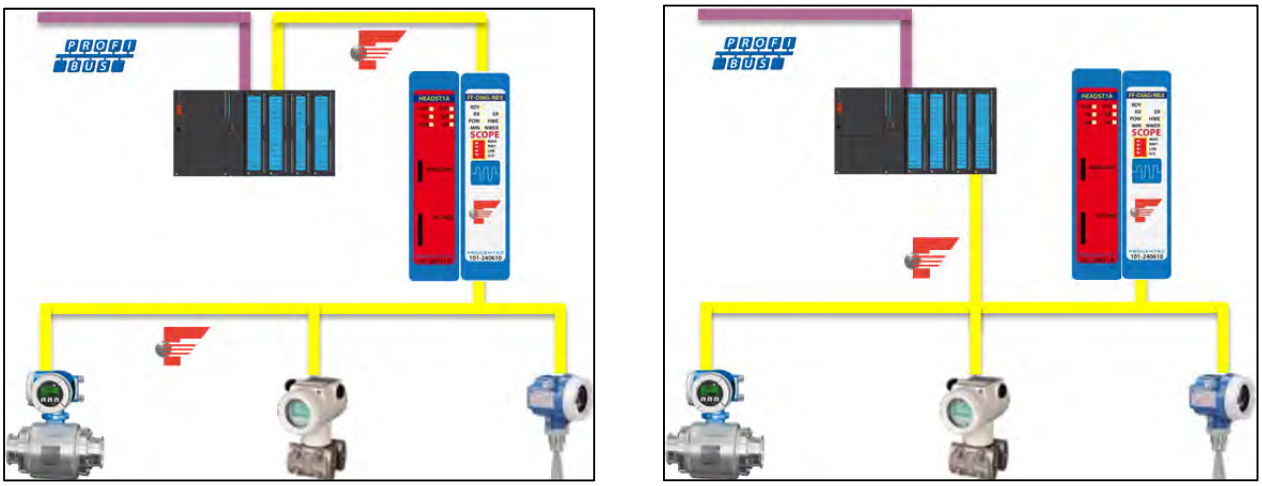
7.2 Physical layer

7.2.1 Connecting an FF segment

There are two ways to connect the module to the FF network. The first method is recommended, because this also makes it possible to measure the DC voltage coming from the FF power supply.



The bottom of the FF module has two identical connections for the FF trunk. These are connected 1-on-1. The module does not have internal termination; always provide correct termination as shown in **Fig. 28**.

Example:

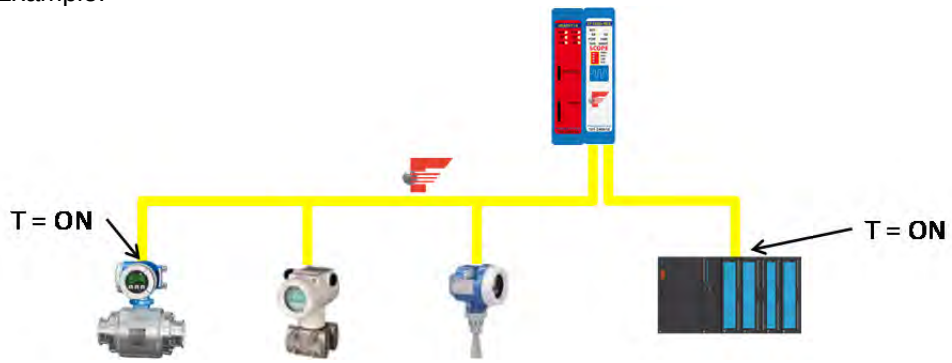


Fig. 28 - FF segment

7.2.2 Using Direct or Indirect grounding

The FF connectors at the bottom of the module have two ways of connecting the shield to the ground: direct and indirect. The ‘SH’ pin is for a direct connection of the shield to the ground. This is sufficient in most applications. In applications with heavy noise or EMC on the cable it is recommended to connect the shield to the “I” pin of the connector.

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7.2.3 Cable specifications

Use the correct cable for your project. **Table 4** shows the cable specifications for FOUNDATION Fieldbus. If a cable is not compliant with these specifications, the reliability of the installation may become unstable.

Table 4 - Cable specifications

Characteristic	Specification
Cable design	Twisted pair, shielded
Maximum conductor cross section (nominal)	0.8 mm² (AWG 18)
Loop resistance (direct current)	44 Ohm/km
Impedance (31,25 kHz)	100 Ohm ±20%
Attenuation (39 kHz)	3 dB/km
Capacitive asymmetry	2 nF/km
Max. propagation delay change (7.9 to 39 kHz)	1.7 µsec/km
Max. shield coverage	90%
Cable length	1900 m

7.2.4 Spur lines

The trunk line on the FF module can have up to 32 spur lines with the following lengths:

Table 5 - Spur lines

Number of spur lines	Length of the spur (Non-Ex)
25 to 32	Max 1 meter
19 to 24	30 meter
15 to 18	60 meter
13 to 14	90 meter
1 to 12	120 meter

The PROFIBUS FF specification allows up to 3 devices on a spur. Please refer to paragraph 7.2.1 for an explanation on how to connect the FF trunk to the FF module.

7.2.5 Current consumption calculations

The FF module provides a maximum of 500mA to the FF trunk. The total current consumption of all slaves on this trunk cannot exceed 500mA. The FF module consumes 10mA. At least one FDE (Fault Disconnection Electronics, stated in the manual of the FF device) should also be calculated . The calculation for the current consumption is as follows:

$I_{SEG} = I_{B0} + I_{B1} + .. + I_{BN} + I_{FDE}$

I_{SEG} = Total current in a segment
I_{BN} = Basic current of devices
I_{FDE} = Current of the **F**ault **D**isconnection **E**lectronics

See **Fig. 29** for an example.

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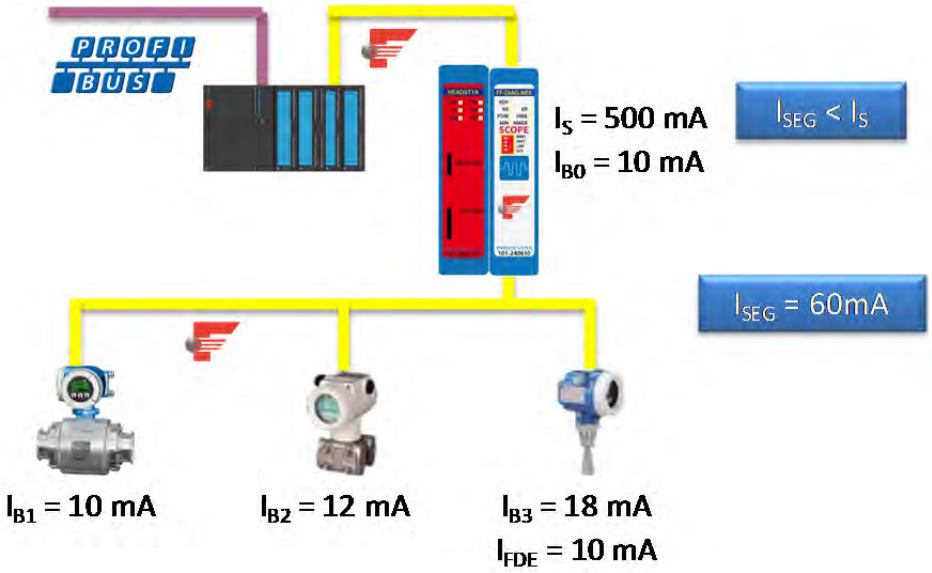

Fig. 29 - Example of current consumption calculation in an FF segment

7.2.6 Voltage at the end of the segment

The resistance of the cable causes a lower voltage at the end of the cable. At least 9V should be available for the last device at the end of the cable. The following calculation is a 'worst case' scenario where all devices are connected at the end of the cable:

$U_B = U_S - (I_{SEG} * R_{CABLE} * L_{SEG})$ (where $U_B > U_{min}$)

U_B = Bus voltage at the last device (V)
U_S = Voltage of the segment coupler (V)
I_{SEG} = Total current In a segment (A)
R_{CABLE} = Resistance per unit length of the cable (Ω/km)
L_{SEG} = Length of all cables in the segment, including stubs (km)
U_{min} = Minimal specified operating voltage of the last device (V)

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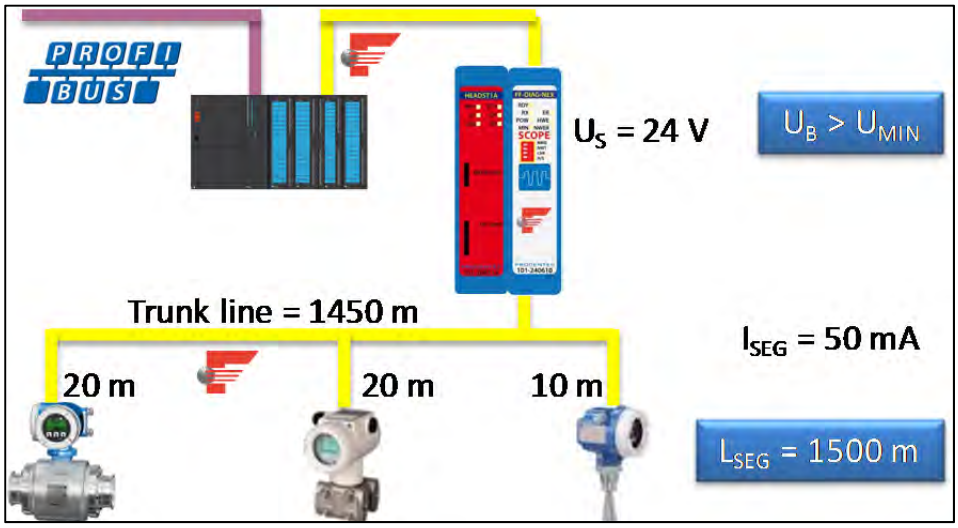

Fig. 30 - Example of voltage calculation at the end of the cable

In this example the voltage at the end of the cable is 24 V - (0.05A * 44 * 1.5) = **20.7 V**

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7.3 Monitoring your FF network

If you have an existing FF network, you can use all 10 slots of the COMbricks system as a monitoring and alarming tool. It measures telegrams and electrical signals which can be displayed in the web server.

7.3.1 Module status

The module status page in the web server displays the following useful status information, see **Fig. 31**

- DC voltage (measured FF bus voltage)
- DC plus and min value (measured FF plus and min voltages)
- DC noise (measured variation in DC voltage)
- DC unbalance (measured difference between +/- and shield)
- Current consumption (measured mA supplied to the FF network by the module)

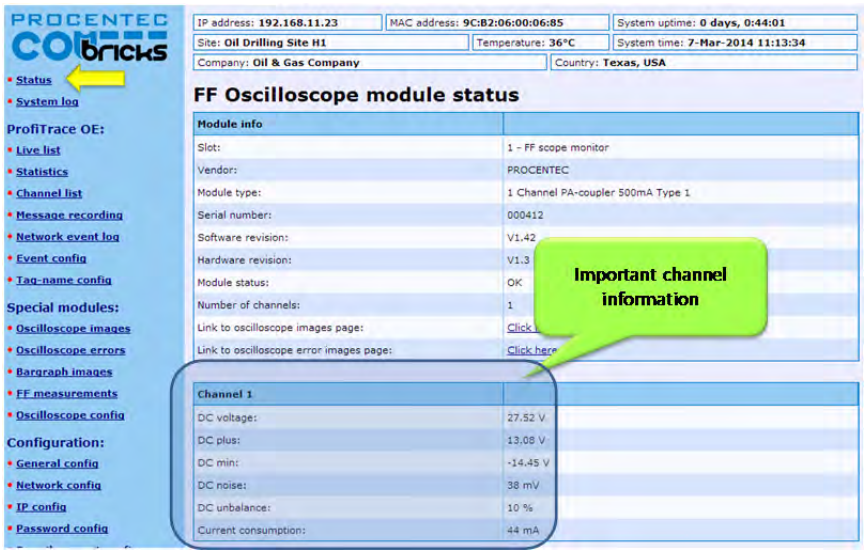

Fig. 31 - FF Oscilloscope module status

To view the page above, click on ‘Status’ in the upper left corner and then the appropriate FF module.

7.3.2 FF oscilloscope images

The FF module has an integrated oscilloscope to measure the signal quality of the telegrams. The oscilloscope has an interface with the web server to display the signals from the devices which are connected to its channel. After opening the web page, all oscilloscope signals are displayed and updated live (see Fig. 32). By default one scope image is updated every second. This can be adjusted in the General Config page (see paragraph 4.4).

Click the button ‘Reset oscilloscope images’ to delete all scope images from memory. If the red ‘AMP’ LED on the FF module was on, this will be switched off. If the values are still not good, the LED will remain on.

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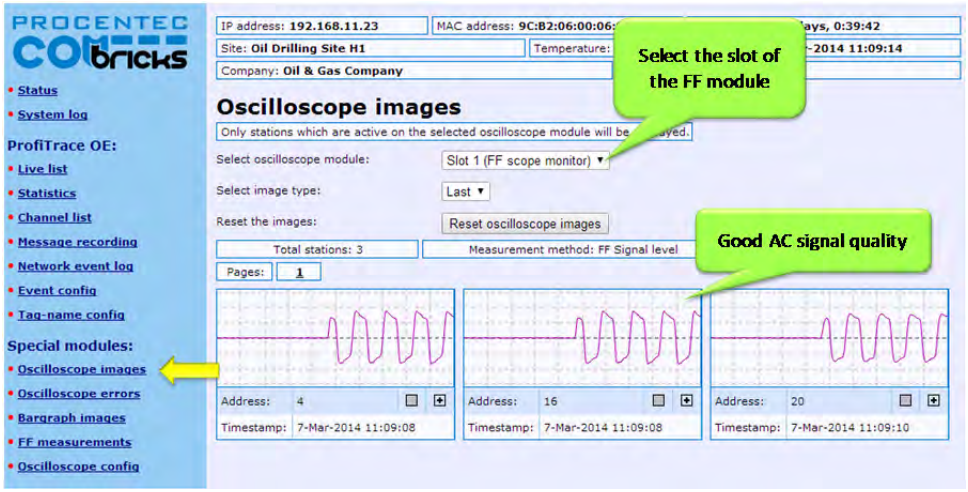

Fig. 32 - Oscilloscope images

7.3.3 FF Bar Graph

The Bar Graph illustrates the average AC signal strength from all available connected devices connected to the FF segment. It is a helpful utility to get an impression of the overall signal quality of the network (see **Fig. 33**).

The average amplitude should be around 750mV. When there are bus problems the Bar graph will display different Voltage levels and the color of the bars will change if the minimum or maximum level has been reached. These levels can be adjusted in the 'Oscilloscope Config' menu (see chapter 7.3.5).

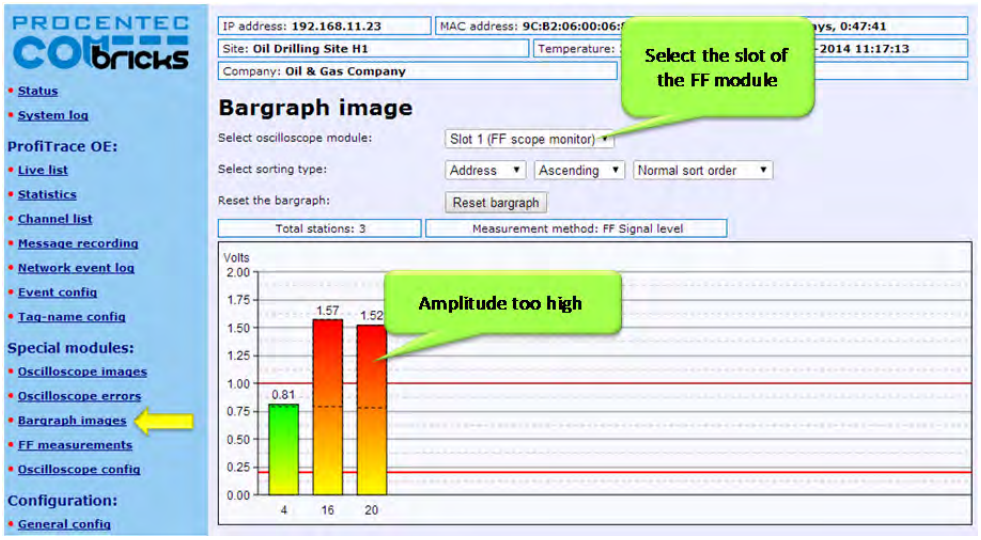

Fig. 33 - Bargraph image for FF

In the above example the amplitude is too high due to missing termination on one side.
Normally the amplitude should be between 750 and 1000 mV.

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7.3.4 FF measurements

The FF measurements page shows a static scope image; it is not an actual scope measurement. The blue arrows illustrate the measured value of the amplitude and the jitter. The values are displayed in the corresponding boxes (see **Fig. 34**).

7.3.4.1 Amplitude

The amplitude is the difference between the highest and the lowest measured value of the AC signal (the actual data). The displayed result is measured by taking samples from all the bits in a telegram. Not the entire bit is measured, but only a small part to filter out irregularities such as overshoots.

7.3.4.2 Jitter

Jitter is described as 'Zero-crossing point deviation', which means that the changing of a bit does not occur at the intended time. This is acceptable within the limit of 3200 nanoseconds, positive or negative. Causes for high jitter times can be wiring mistakes, EMI, cable cross talk or device problems.

7.3.4.3 Polarity

This is NOT the polarity of the bus wiring, but the internal communication signal. In some products it is possible that the polarity is switched. This does not affect the communication.

7.3.4.4 DC noise

The DC noise indicates how much the voltage of the signal varies. If the noise is too high it can influence the communication; it should not exceed 100 mV.

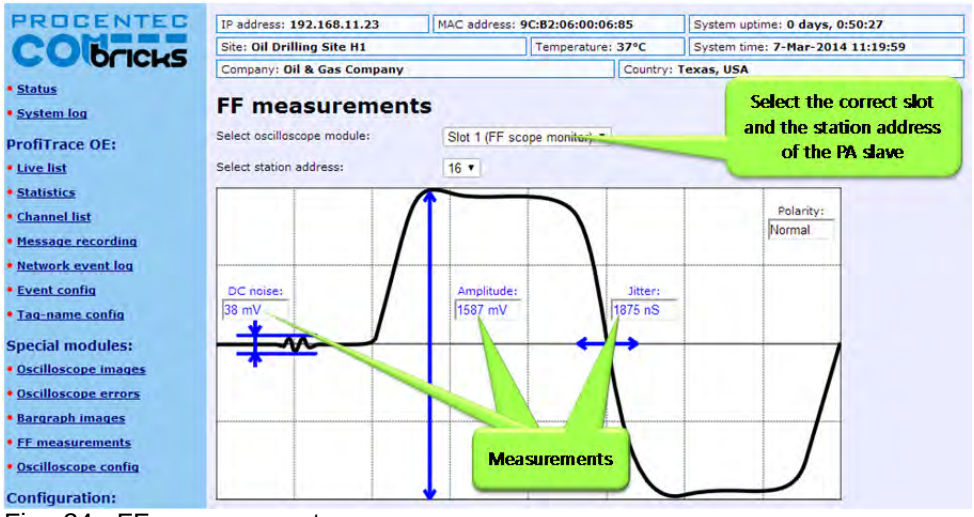

Fig. 34 - FF measurements

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7.3.5 Oscilloscope configuration

In the Oscilloscope Config page (see **Fig. 35**) you can set various warning levels for the FF module. These warning levels are shown in the FF Bar Graph, and are used for e-mail alarms, logging and output control (see paragraphs **4.6** and **5.1**).

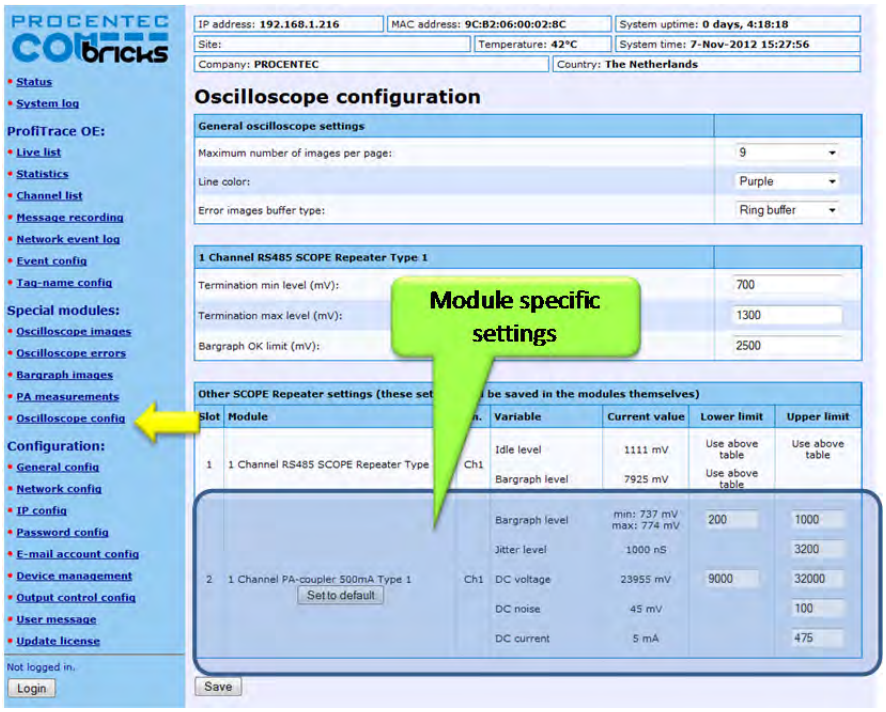

Fig. 35 - Oscilloscope configuration

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8 Firmware updates

The Updater tools and new firmware for the Head Station and for the modules can be downloaded from **www.procentec.com/combricks**.

Firmware files have the extension *.PKG*.

For updating the firmware of the Head Station a mini USB cable is required.
For updating modules an Ethernet connection to the COMbricks is required.

8.1 Updating the Head Station

The Firmware Update procedure requires a power-down of the COMbricks system. Modules will not be active during the update sequence. This means that the repeater functionality of the COMbricks is disabled and (parts of) the network will be down.

After downloading the firmware and installing the firmware update tool, follow the procedure below:

STEP 1: Shutdown ALL power to the Head Station (also USB cables and power modules).

STEP 2: Hold the menu switch of the Head Station down and at the same time provide power to the Head Station. In the firmware update mode the SF and IOF LEDs should be blinking.

STEP 3: Connect the mini USB to the Head Station (see **Fig. 36**).

Fig. 36 - Firmware update cable

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STEP 4:	Start the firmware update tool. If the tool detects the Head Station in the firmware update mode, the "Start update" button is enabled (see **Fig. 37**).
STEP 5:	Click on "Start update" to browse to the .PKG file and click "OK". The tool will now upload the new firmware to the Head Station.
STEP 6:	After the upload the Head Station will update the firmware. This can take a few minutes. **The window that appears be can closed directly**!
STEP 7:	Verify the firmware update by checking the firmware version in the web server (bottom of each web page).

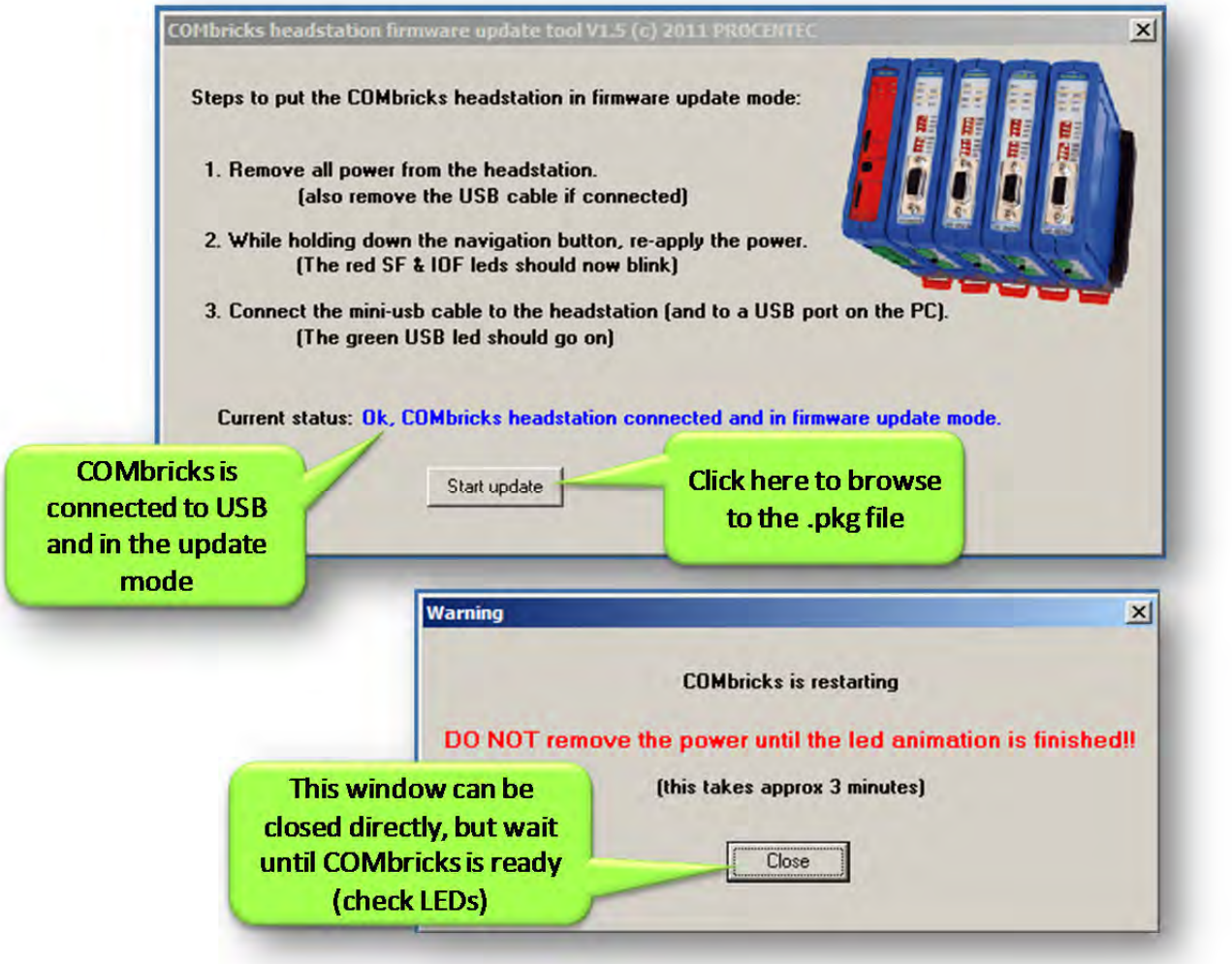
COMbricks headstation firmware update tool V1.5 (c) 2011 PROCENTEC
Steps to put the COMbricks headstation in firmware update mode:
1. Remove all power from the headstation.
(also remove the USB cable if connected)
2. While holding down the navigation button, re-apply the power.
(The red SF & IOF leds should now blink)
3. Connect the mini-usb cable to the headstation (and to a USB port on the PC).
(The green USB led should go on)
Current status: Ok, COMbricks headstation connected and in firmware update mode.
Start update
COMbricks is connected to USB and in the update mode
Click here to browse to the .pkg file
Warning
COMbricks is restarting
DO NOT remove the power until the led animation is finished!!
(this takes approx 3 minutes)
Close
This window can be closed directly, but wait until COMbricks is ready (check LEDs)

Fig. 37 - Firmware update tool

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8.2 Updating modules

Some COMbricks modules can get new functionality by updating the module firmware. These updates are not distributed through the Head Station firmware, but in separate Module firmware packages. For a listing of all available firmware, see **www.procentec.com/combricks**.

The tool for updating the module firmware is different than the tool for updating the Head Station. It can be downloaded from the above mentioned location.

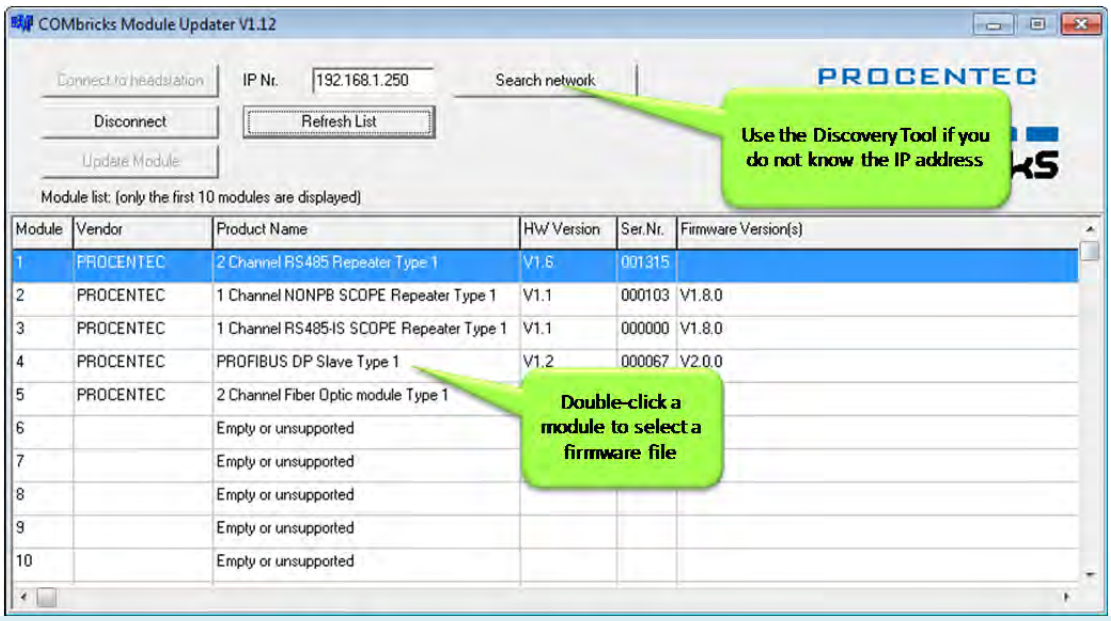
After downloading the update tool and the module firmware follow the procedure below:

STEP 1: Make sure the Head Station and targeted module(s) are powered and running.

STEP 2: Connect an Ethernet cable between the Head Station and your workstation and verify the network connection.

STEP 3: Start the Module firmware update tool and enter the IP address of the targeted COMbricks Head Station. If you do not know the IP address, use 'Search network' to open the Discovery Tool and select the correct Head Station.

STEP 4: Click 'Connect to Head station' in the Update tool. It will scan all slots to check the module types.


COMbricks Module Updater V1.12
Connect to headstation
IP Nr.
192.168.1.250
Search network
PROCENTEC
Disconnect
Refresh List
Update Module
Use the Discovery Tool if you do not know the IP address
Module list: (only the first 10 modules are displayed)
Module
Vendor
Product Name
HW Version
Ser.Nr.
Firmware Version(s)
1 PROCENTEC 2 Channel RS485 Repeater Type 1 V1.6 001315
2 PROCENTEC 1 Channel NONPB SCOPE Repeater Type 1 V1.1 000103 V1.8.0
3 PROCENTEC 1 Channel RS485-IS SCOPE Repeater Type 1 V1.1 000000 V1.8.0
4 PROCENTEC PROFIBUS DP Slave Type 1 V1.2 000067 V2.0.0
5 PROCENTEC 2 Channel Fiber Optic module Type 1
Double-click a module to select a firmware file
6 Empty or unsupported
7 Empty or unsupported
8 Empty or unsupported
9 Empty or unsupported
10 Empty or unsupported

STEP 5: Double-click the targeted module slot. A file dialog will appear; navigate to the local folder where you stored the firmware package.

STEP 6: The tool automatically filters all unrelated firmware files; you cannot select incorrect files. Choose the firmware and click 'Open'. The firmware update will start automatically. You should see the windows as shown in **Fig. 38** and **Fig. 39**.

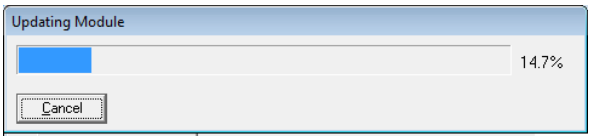


Fig. 38 - Updating module

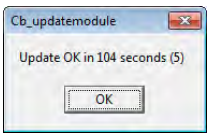


Fig. 39 - Update complete

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9 Tips and Tricks

9.1 Solution for secured email connections

Because COMbricks can only handle unsecured email connections, a proxy between COMbricks email and outgoing email could be helpful. hMailserver is a free tool that creates a mail server on one of the local PCs in the network. COMbricks can mail the events to this mailserver and the mailserver can forward it through a secured connection to an external mailserver.
www.hmailserver.com

9.2 IP address adjustment tool

Every time you go 1-on-1 with a laptop to a COMbricks unit, the IP settings of your laptop have to be adjusted to fit the local IP address of the COMbricks. To make this step very easy a tool is available with the name NetSetMan to automatically change all the settings according to customized profiles.
www.netsetman.com

9.3 Free Wi-Fi channel detector

For COMbricks streaming with the ProfiTrace 2 software over Wi-Fi, a clean connection is required to keep the streaming performance as high as possible. To verify that your Wi-Fi does not overlap with other channels, we recommend to use the free tool inSSIDer.
www.metageek.net/products/inssider

9.4 Some SNMP tools

To test the COMbricks SNMP functionality, you can use the tools below:
- SNMPb
- NetSentinel by Micromedia
- MIBbrowser by iReasoning
- Solarwinds

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10 Technical Data - COMbricks in general

Technical Data - COMbricks in general	
Dimensions, weight and mounting	
Dimensions H x D x W (mm) **Weight** **DIN-rail**	140 x 110 x 25 mm (1 module) 150 g 35 mm (minimal 50 mm wide)
Ambient conditions	
Operating temperature **Isolation class**	0..60° Celsius IP 20 (DIN 40 050)
Colours and material	
Housing **Backplane** **DIN rail clip** **Side cap**	RAL 5017 (blue) - ABS RAL 7037 (grey) - ABS RAL 2004 (orange) - PP RAL 7024 (anthracite) - PP

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11 Technical Data - Head Station 1A/1B/1C

Technical Data - Head Station 1A/1B/1C	
Type differences (Hardware is identical with all types)	
Head Station 1A Head Station 1B Head Station 1C For all Head Stations	No ProfiTrace OE ProfiTrace OE for 1 PROFIBUS network + ProfiTrace 2 live streaming + OPC (since June 2013) ProfiTrace OE for 4 PROFIBUS networks + ProfiTrace 2 live streaming + OPC CommDTM
Backplane	
Modules Current available for the backplane PROFIBUS networks Compatible backplane units	32 (10 repeater modules positioned in the first 10 slots) 2.5 A 4 101-200012, 101-200023, 101-200024, 101-200027
Power supply specifications	
Nominal supply voltage Current consumption Power Reverse polarity protection Redundant power supply Wire diameter	10.8 .. 26.4 VDC 800 mA (fully loaded) 20 W Yes Yes < 2.5 mm^2
Ethernet	
Connector Cable length Link speed MAC address Supported protocols Default IP address after reset/purchase Connections	RJ 45 Max. 100 m 10 / 100 Mbps 9C.B2.06.xx.xx.xx (label on the side of the Head Station) HTTP, FTP, SMTP, TELNET, DHCP, SNMP **192.168.1.254** 20 simultaneous web server clients

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Technical Data - Head Station 1A/1B/1C	
Relay contact	
Resistance Voltage Current	300 mOhm (plug included) 170 VAC 0.5 A
SD Card	
Types Size	SD and SDHC Max. 32 GB (2 GB is provided)
Others	
Weight MTBF	150 g To be defined
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12 Technical Data – FF Diag Module (101-240610)

Technical Data – FF Diagnostics Module (101-240610)	
Backplane	
Networks Power supply for the module Current consumption Compatible backplane units	10 FF H1 networks Provided through the backplane ± 350 mA (555 mA max) 101-200011, 101-200012, 101-200023, 101-200024, 101-200027
FF cable specifications	
Cable length Wire diameter Wire type	Max. 1900 m cable length (FF specifications) < 2.5 mm2 Stranded or solid core
FF power specifications	
Trunk voltage Trunk current Current consumption Number of devices Baudrate	10 .. 27 V (customizable and Non-Ex) 500 mA 10 mA (in all modes) 32 (FF specifications) 31.25 kbps PA signal
Connector specifications	
2 removable FF screw terminals FF-, FF+ SH I Removable power connector -, + SH	(1-on-1) Wire colors are undefined Direct grounding Indirect grounding 11 .. 28 V (Max. 600 mA) Direct grounding
Oscilloscope specifications	
AC FF voltage DC FF voltage DC FF current:	4 MS/s, resolution 7.5 mV, range -0.95..0.95 V 1 kS/s, resolution 75 mV, range -38..+38 V 1 kS/s, resolution 1 mA, range 0..1024 mA

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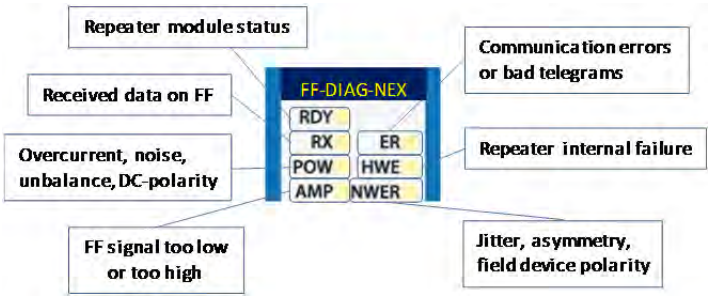
Technical Data – FF Diagnostics Module (101-240610)	
Dipswitches	
NW0 NW1 LNK H/S LEFT / RIGHT	Not used Not used Settings Hardware / Software
LEDs	
RDY RX HWE ER AMP POW NWER	Module is ready for operation (ON) Receiving FF telegrams (blinking) Internal repeater error (contact PROCENTEC) No or bad telegrams on FF detected FF signal too low or too high Overcurrent, noise, unbalance, DC-polarity Jitter, asymmetry, field device polarity *Alarm values can be changed in the web server.* 
Others	
Head Station firmware Operating temperature Weight MTBF	At least version 1.279 0 .. 60 °C 133 g To be defined
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13 Technical Data - 8 CH D-out Module (101-210110)

Technical Data - 8 Channel Digital Out Module (101-210110)	
Backplane	
Controllers Modules Power supply module electronics Power supply digital outputs Current consumption module electronics Compatible backplane units	Web server, PROFINET IO device, PROFIBUS DP slave 32 (all slots) Provided through the backplane Provided through an additional 3-pin connector ± 290 mA (465 mA max) 101-200011, 101-200012, 101-200023, 101-200024, 101-200027
Digital Outputs	
Outputs Current Voltage range Losses	8 Digital Outs on 1 connector 0.5 A per Digital Out (direct current) 15..30 VDC (depends on provided voltage) 0.211 Ohm loss per Digital Out
Power Connector	
Pins power connector Wire diameter (for the screw terminals) Wire type	1 = -, 2 = +, 3 = SH < 2.5 mm^2 Stranded or solid core
Digital Output Connector	
Pins DO connector Wire diameter (for the screw terminals) Wire type	1 = GND, 2..9 = DO0..DO7, 10 = GND < 1.5 mm^2 Stranded or solid core
Others	
Head Station firmware Dimensions Operating temperature Weight MTBF	V1.260 and later 140 x 110 x 25 mm 0 .. 60 °C 105 g To be defined
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14 Technical Data - 6A Power Module T1 (101-230010)

Technical Data - 6A Power Module Type 1 (101-230010)	
Backplane	
Modules Current consumption from the backplane Compatible backplane units	32 (all slots) ± 130 mA (465 mA max) 101-200011, 101-200012, 101-200023, 101-200024, 101-200027
Backplane power	
Current Maximum combined backplane current	**6 A** *12 A* (provided by all inserted power modules)
Power supply	
Nominal supply voltage Current consumption Power Reverse polarity protection Redundant power supply	12 .. 30 VDC Max. 2 A @ 24 VDC Max. 42 W Yes Yes
Power supply connectors	
Pins Wire diameter (for the screw terminals) Wire type	1 = - (left) 2 = + (middle) 3 = Ground (right) < 2.5 mm^2 Stranded or solid core
LEDs	
ERR ON ERR + RUN OFF	Input voltage too low, or maximum current No power supply connected
Others	
Head Station firmware Dimensions Operating temperature Weight MTBF	V1.265 and later 140 x 110 x 25 mm 0 .. 60 °C 125 g To be defined
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15 Frequently asked questions / FAQ

- General -

Are the Kits in the product list really required?
NO, the Kits are just an easy step into the COMbricks world, because they contain all required components. You can also order all items separately; Head Station, repeater modules, I/O modules, etc. Kits are also cheaper than separate items.

Backplane

How many modules can I insert in the backplane?
COMbricks can handle 32 modules, but high speed modules can only be inserted in the first 10 sockets (repeater and fiber optic modules). If you only have 5 high speed modules, the rest of the sockets can be completed with regular modules (I/O modules).

What is the "Backplane Network"?
These are the 4 internal networks on the backplane that repeater modules utilize to transfer PROFIBUS messages transparently to other inserted repeater modules who are locked to the same network number. Each network can have its own masters, slaves and baudrate. They are completely isolated.
http://www.youtube.com/watch?v=P3_gSC1pJO4

When I buy a module, is a backplane socket provided?
YES, with every module a backplane socket is provided. If you require more sockets because of spare parts, an additional set can be purchased.

Installation

What is the default IP address after purchase or reset?
The default IP address is; **192.168.1.254**. This can be customized through the web server of the Head Station or the COMbricks Discovery Tool.

Do you need a constant PC connection to monitor the network?
NO, This is a great feature for permanent monitoring. COMbricks contains a kernel and web server that works independently directly after power-up. Updates of the Live List, Statistics, Logging, Emailing, etc. are all carried out on its own initiative and can always be viewed.

Where does it save monitoring data, logs and settings?
The Head Station contains a uSD card on which all information is stored. By means of the web server or FTP the user can inspect and download the information. He can of course also take out the SD card and insert it in a PC.

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16 Sales offices and distributors

HEADQUARTERS

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Internet: www.efalcom.com.ar

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Fax: +32 2 720 37 50
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Internet: www.bintz.be

BRAZIL

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Internet: www.controlsystem.sk

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17 Products and spare parts

Component	Order code	Remarks
Eco Monitoring Kit	101-200QBR	• Head Station type 1B • 1CH repeater • Fixed backplane unit
Standard Monitoring Kit	101-200QBS	• Head Station type 1B • Scope repeater • Fixed backplane unit
Advanced Monitoring Kit	101-200Q4CS	• Head Station type 1C • 4pcs Scope repeater • Fixed backplane unit
Fiber Optic Kit	101-200QQAFR	• Head Station type 1A • 1CH repeater • 2CH FO coupler • Fixed backplane unit
RS 485-IS Monitoring Kit	101-200QBX	• Head Station type 1B • RS 485-IS module • Fixed backplane unit
RS 485-IS Repeater Monitoring Kit	101-200QBXR	• Head Station type 1B • 1CH repeater • RS 485-IS module • Fixed backplane unit
PA Monitoring Kit	101-200QBP	• Head Station type 1B • PA coupler module • Fixed backplane unit
PA Coupler Monitoring Kit	101-200QBPR	• Head Station type 1B • 1CH repeater • PA coupler module • Fixed backplane unit

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Component	Order code	Remarks
Head Station Type 1C	101-20011C	**- ProfiTrace OE on 4 networks** - 2 GB SD card - Ethernet port - Redundant power supply - Drives 32 modules - CommDTM - Backplane unit **- Streaming in ProfiTrace 2** **- OPC in ProfiTrace 2**
Head Station Type 1B	101-20011B	**- ProfiTrace OE on 1 network** - 2 GB SD card - Ethernet port - Redundant power supply - Drives 32 modules - Backplane unit included **- Streaming in ProfiTrace 2** **- OPC in ProfiTrace 2**
Head Station Type 1A	101-20011A	**- Basic web server** - 2 GB SD card - Ethernet port - Redundant power supply - Drives 32 modules - Backplane unit included - **NO ProfiTrace OE**
SCOPE Repeater	101-201210	- 1 RS 485 channel repeater with oscilloscope - Same specs as regular 1 channel repeater - 192 MS/s sample rate - 50 mV resolution - -6.436..6.436 V - Backplane unit included
2 Channel Repeater	101-201102	- 2 RS 485 channels - 12 Mbps - 31 devices per channel - Screw terminals - DB9 connector - Redundancy - Termination - Backplane unit included

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Component	Order code	Remarks
1 Channel Repeater	101-201101	- 1 RS 485 channel - 12 Mbps - 31 devices per channel - Screw terminals - DB9 connector - Redundancy - Termination - Backplane unit included
2 Channel Fiber Optic Module	101-201510	- 2 fiberoptic channels - 3 km cable length - 2 x 2 ST connectors - Redundancy - Backplane unit included
PA Coupler Module	101-201610	- transparent up to 1.5 - trunk voltage up to 27 V - trunk current 500 mA - auto termination (in coupler mode) - Backplane unit included
SALT Repeater Module	101-201710	- Adjustable termination: 94..940 Ohm - Adjustable idle voltage: 0..5 V - Same specs as regular Scope Repeater - Backplane unit included
RS 485-IS Barrier Module	101-201410	- 1 RS 485-IS channel repeater with oscilloscope - Suitable for Zone II (2) G [Ex ia Gb] IIC - 192 MS/s sample rate - Backplane unit included
PROFINET Device Module PND-001	101-220110	- Couples up to 10 networks (PB/PN) - Conformance class B - RT_CLASS_1 - Backplane unit included
PROFIBUS Slave Module PBS-001	101-220210	- Couples up to 10 networks (PB/PN) - Remote I/O, digital and relay contacts - Auto baudrate detect - Backplane unit included
4 Channel Relay Module	101-210210	- 5 A - 230 VAC - Backplane unit included

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Component	Order code	Remarks
8 Channel Digital Out	101-210110	- 0.5 A - 24 VDC - Backplane unit included
8 Channel Digital In	101-210010	- 3 .. 32 VDC - Backplane unit included
Power Module	101-230010	- Provides 6 A to the backplane - Backplane unit included
Fixed Backplane **7 Modules**	101-200027	- Fits: 1 Head Station and 6 regular modules - Extendible with standard backplane units - Improved durability
Fixed Backplane **4 Modules**	101-200024	- Fits: 1 Head Station and 3 regular modules - Extendible with standard backplane units - Improved durability
Fixed Backplane **3 Modules**	101-200023	- Fits: 1 Head Station and 2 regular modules - Extendible with standard backplane units - Improved durability
Fixed Backplane **2 Modules**	101-200012	- Fits: 1 Head Station and 1 regular module - Extendible with standard backplane units - Improved durability
Backplane Units **5-pack**	101-200011	- Pack of 5 pieces - Suitable for all regular modules - **NOT for Head Stations**

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18 About PROCENTEC

PROCENTEC is an independent company, concentrating all its products and services on PROFIBUS and PROFINET technology. Our main business is the export of in-house developed automation products through our worldwide distributor network. PROCENTEC is also providing vendor independent training and support to end-users.

We are an international PROFIBUS and PROFINET Competence/Training Center with all the required expertise available to realize our projects and services. We have the availability of some real experts whose knowledge makes us unique in the world. Because of our international recognition we are often contracted and offer a wide range of commercial services (consultancy, training, commissioning, maintenance and troubleshooting). PROCENTEC has 2 offices; the headquarters is based in The Netherlands and a sales office is located in Germany.

Testlab
PROCENTEC runs 1 of the 8 accredited test laboratories for the certification of PROFIBUS devices. In our laboratory vendors can have their products tested on PROFIBUS compatibility.

Product development and export
We develop in house PROFIBUS and PROFINET products that are being exported through our worldwide distributor network. Especially in the area of maintenance tools we have gained a unique market position.

Democenter
We have a demonstration facility, which is used for support, training, demonstrations, engineering and trade fairs. It consists of more than 250 devices from more than 40 vendors.

Training and Education
PROCENTEC is very successful with its training program. Up to now, more than 4000 participants have received a certificate. The costs incurred for engineering, assembly, commissioning and maintenance always play a key role when choosing a fieldbus. We train our participants that the implementation of PROFIBUS and PROFINET can help to cut costs in all areas. Our practical experience is the key factor! PROCENTEC offers different types of PROFIBUS and PROFINET training modules which are organised on a regular basis.

PROCENTEC is a professional organisation, which is involved in PROFIBUS and PROFINET technology 24-hours a day. It has the availability of experts who are constantly deployed worldwide. Not only is the tried and tested automation technology ideal for the use in both Factory and Process automation, but support is also ensured through the products and services of PROCENTEC.

www.procentec.com

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19 Certificates

Certificate of Compliance

This certificate is issued under the conditions as described in the test report as mentioned below

Certificate number:	10C01036CRT02
Product name:	COMbricks
Model number:	--
Serial number: (Product identification)	COMbricks head station: SN203, COMbricks 2Ch Repeater: SN101
Manufacturer:	Procentec Turfschipper 41 2292 JC WATERINGEN The Netherlands
Measurements carried out on behalf of:	Procentec Turfschipper 41 2292 JC WATERINGEN The Netherlands
Applicant's representative:	Mr. M. de Brabander
In the capacity of:	Manufacturer
Date of measurement:	2010 November, 4,5
The measurement results are laid down in report:	10C01036RPT02
The product has been examined according to [1]:	Emission: EN 55022 (2006) + A1 (2007), class A Immunity: EN 55024 (1998) + A1 (2001) + A2 (2003)

[illegible] advies, research & EMC Consultancy B.V.
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The Standard for EMC- & Radio Automotive and Electrical Safety

Consultancy

D. van der Vlugt
Director

Woerden, 2011 March, 15

[1] Has been found in compliance with the harmonised standards under the EMC directive 2004/108/EC

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Certificate of Compliance

This certificate is issued under the conditions as described in the test report as mentioned below

Certificate number:	10C01037CRT02
Product name:	COMbricks
Model number:	--
Serial number: (Product identification)	COMbricks head station: SN203, COMbricks 2Ch Repeater: SN101
Manufacturer:	Procentec Turfschipper 41 2292 JC WATERINGEN The Netherlands
Measurements carried out on behalf of:	Procentec Turfschipper 41 2292 JC WATERINGEN The Netherlands
Applicant's representative:	Mr. M. de Brabander
In the capacity of:	Manufacturer
Date of measurement:	2010 November, 4,5
The measurement results are laid down in report:	10C01037RPT02
The product has been examined according to [1]:	Emission: 47 CFR 15, class A

[illegible] advies, research & EMC Consultancy B.V.
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The Standard for EMC- & Radio Automotive and Electrical Safety

DARE!
Consultancy

D. van der Vlugt
Director

Woerden, 2011 March, 15

[1] *Has been found in compliance with the harmonised standards under the EMC directive 2004/108/EC*

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QualityMasters
ISO Certificering

certificate

QualityMasters hereby declares that

Procentec B.V.
Wateringen

has a management system that meets the requirements of the standard

NEN-EN-ISO 9001:2008

for the scope

Providing training courses, technical support, product development and the exploitation of the test laboratory.

Date of original approval	10-02-2003
Date of issue	10-04-2013
Valid until	10-02-2016
Certificate number	NL 6313uk

On behalf of Stichting QualityMasters,

N.B. The failure to meet the conditions as set forth in the certification agreement, or non-compliance with the given standard and/or guidelines, may lead to the suspension or cancellation of the certificate.
This certificate remains the property of Stichting QualityMasters, Nieuwland Parc 157, 3351 LJ Papendrecht.

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PI
PROFIBUS • PROFINET

Certificate
for a PI Competence Center

PI confirms that

PROCENTEC
Dennis van Booma
Turfschipper 41
2292 JC Wateringen
THE NETHERLANDS

is a fully accredited PI Competence Center for
PROFIBUS basic
PROFIBUS PA.

This certificate is granted according to the Quality of Services Agreement for PI Competence Centers and is valid until December 31, 2013.

Peter Wenzel
(Official in Charge)

Chairmen of PI

(Jörg Freitag, Chairman)

(Michael J. Bryant, Deputy Chairman)

PROFIBUS®

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PI PROFIBUS • PROFINET

Certificate

Authorization as PI Test Laboratory for PROFIBUS

PROFIBUS Nutzerorganisation e.V. accepts
PROCENTEC
Turfschipper 41
2292 JC Wateringen
The Netherlands

as authorized PI Test Laboratory for:

PROFIBUS Slave Devices

PA Profile Devices

The authorization is based on the assessment dated March 4, 2011, and the related assessment report.

The execution of the tests aimed in the PROFIBUS certification shall be conform to the PROFIBUS Standard and the valid guidelines.

This authorization is valid until December 31, 2012.

(Official in Charge)

Board of PROFIBUS Nutzerorganisation e. V.

(J. Freitag) (K.-P. Lindner)

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PROFIBUS • PROFINET

Certificate

PROFIBUS Nutzerorganisation e.V. grants to

PROCENTEC
Turfschipper 41, 2292JC Wateringen, The Netherlands

the Certificate No: **Z01776** for the PROFIBUS Device:

Model Name:	**PBS_001**
Revision:	**V2.1; SW/FW: Version 2.1; HW: Version 1.3**
GSD:	**PROC696F.GSD, File Version: 18-07-2013**

This certificate confirms that the product has successfully passed the certification tests with the following scope:

☑	DP-V0	MS0, Sync, Freeze, Fail_Safe, Set_Slave_Add
☑	Physical Layer	RS485

Test Report Number:	**PCN174-DPS-02**
Authorized Test Laboratory:	**PROCENTEC, Wateringen, The Netherlands**

The tests were executed in accordance with the following documents:
"Test Specifications for PROFIBUS DP Slaves, Version 3.09, September 2008".
This certificate is granted according to the document:
"Framework for testing and certification of PROFIBUS and PROFINET products".
For all products that are placed in circulation by August 20, 2016 the certificate is valid for life.

(Official in Charge)

Board of PROFIBUS Nutzerorganisation e. V.

(Karsten Schneider)

(K.-P. Lindner)

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PROFIBUS • PROFINET

Certificate

PROFIBUS Nutzerorganisation e.V. grants to

PROCENTEC
Turfschipper 41, 2292JC Wateringen, The Netherlands

the Certificate No: **Z10500** for the PROFINET IO Device:

Model Name:	**PND-001**
Revision:	**V1.0.0; SW/FW: V1.1.0; HW: 1**
Identnumber:	**0x4000; 0x0001**
GSD:	**GSDML-V2.25-PROCENTEC-COMbricks PND_001-20120831.xml**
DAP:	**DIM 1- DIM 10, Module ID 0x0001F900 - 909 together with PND-001, Module ID 0x00010500**

This certificate confirms that the product has successfully passed the certification tests with the following PROFINET scope:

☑ Hardware	Auto_Negotiation, Auto_Polarity, Auto_Crossover
☑ Conformance Class B	RT_CLASS_1, RTA, LLDP, SNMP, MIB-II, LLDP-MIB

Test Report Number: **PN194-1**
Authorized Test Laboratory: **SIEMENS AG, Fürth, Germany**

The tests were executed in accordance with the following documents:
"Test Specifications for PROFINET IO devices, Version 2.2.4 from December 2010" and
"Test Cases for PN-Tester for PROFINET IO devices, Version 2.2.4.16.21".
This certificate is granted according to the document:
"Framework for testing and certification of PROFIBUS and PROFINET products".
For all products that are placed in circulation by September 06, 2015 the certificate is valid for life.

(Official in Charge)

Board of PROFIBUS Nutzerorganisation e. V.

(Karsten Schneider)

(K.-P. Lindner)

PROFINET®

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20 Revision history

V 1.0.0 - **Initial release**

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21 Next versions

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22 Notes

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Other PROCENTEC products

PROFINET Cable Tester

- ✓ Suitable for 4- and 8-wire PROFINET and regular Ethernet cables
- ✓ Suitable for straight and 90°, metal or plastic PROFINET plugs
- ✓ Tests cable shielding
- ✓ Detects short circuits, wire breaks, swaps, miswiring and split pairs
- ✓ Large LCD clearly indicates the test results
- ✓ 150 hours on one 9 V battery
- ✓ Operating temperature: 0 to 50 °C
- ✓ Just 1-key-press to start continuous testing
- ✓ It can also test telephone and coax cable

www.profinetcabletester.com

Compact PROFIBUS Repeater

- ✓ Single channel PROFIBUS repeater
- ✓ Transparent
- ✓ Increased signal strength
- ✓ 12 Mbps
- ✓ Auto baudrate detection
- ✓ Redundant power supply
- ✓ Digital glitch filtering
- ✓ No limit in cascading
- ✓ Integrated switchable termination
- ✓ Diagnostic LEDs
- ✓ DB9 connector for measurements
- ✓ **IP 20 with DIN-rail mounting**

www.procentec.com/profihub/b1/en

Other PROCENTEC products

ProfiHub B5

- ✓ 5 Isolated channels
- ✓ Transparent
- ✓ Increased signal strength
- ✓ 31 devices per channel
- ✓ 12 Mbps
- ✓ 1200 m spur line length
- ✓ No address required
- ✓ Integrated switchable termination
- ✓ LEDs to indicate termination is ON
- ✓ Screw terminals and DB9 connectors
- ✓ IP 20 with DIN-rail mounting

ProfiHub A5

- ✓ 5 Isolated channels
- ✓ Transparent
- ✓ Increased signal strength
- ✓ 31 devices per channel
- ✓ 12 Mbps
- ✓ 1200 m spur line length
- ✓ No address required
- ✓ Integrated switchable termination
- ✓ IP 65 classification

www.procentec.com/profihub

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